



Annual Climate Summary 2009

Central Alaska Network

Natural Resource Data Series NPS/CAKN/NRDS—2012/272



ON THE COVER

Climate station at Dunkle Hills in Denali National Park and Preserve
Photograph by: NPS photo by Pam Sousanes

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All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner. This report received informal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data. Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols.

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Contents

	Page
Figures.....	v
Tables.....	vii
Executive Summary	ix
Introduction.....	1
Central Alaska Network Climate Characterization	1
Methods.....	3
Results.....	5
Climate Year 2009 Synopsis	5
Temperature	11
Precipitation	17
Discussion	23
Literature Cited	25
Appendix A: Period of Record Means for Long-term Sites in CAKN.....	27
Appendix B: 2009 Extremes at Long-term CAKN Sites.....	39
Appendix C: CAKN 2009 Climate Station Monthly Data	41
Appendix D: Worldwide Significant Climate Anomalies and Events 2009.....	59

Figures

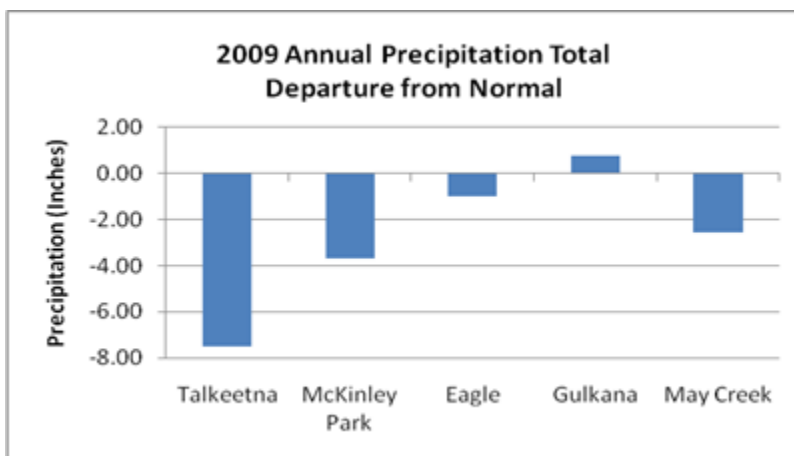
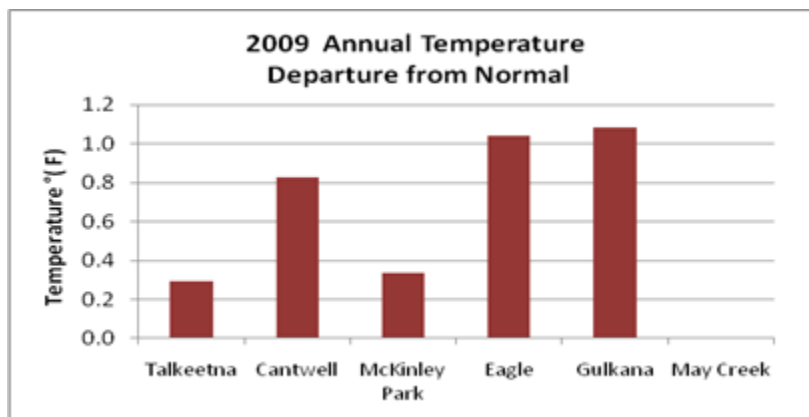
	Page
Figure 1. Mean annual temperature departures for Alaska showing the shift to a warmer regime in 1976 that correlates with the PDO.....	2
Figure 2. Map of CAKN climate station locations.	4
Figure 3. Mean annual temperature and precipitation totals for long-term sites in CAKN for 2009 compared with 1971-2000 normals.	7
Figure 4. Average temperatures across Alaska were 0.7 ° F below the 1971-2000 mean (NOAA 2010).	8
Figure 5. Seasonal statewide temperature anomalies 2009	9
Figure 6. March 1 and May 1 snowpack depths for Alaska 2009 (NRCS 2010).	9
Figure 7. Pacific Decadal Oscillation index. Note the negative departure for 2009	10
Figure 8. Arctic sea ice extent 2009. This was the third lowest year on record. Graph retrieved from.....	10
Figure 9. 2009 Mean annual temperature departure from normal at long-term CAKN sites.	11
Figure 10. CAKN 2009 mean monthly temperatures departure from normal at long-term sites.	12
Figure 11. CAKN mean monthly temperatures	14
Figure 12. CAKN mean annual temperatures.....	15
Figure 13. CAKN mean monthly temperatures – Paired high and low elevation sites for 2009.....	17
Figure 14. Annual precipitation totals departure from normal for long-term CAKN sites – 2009.	18
Figure 15. Monthly precipitation totals departure from normal for 2008.....	19
Figure 16. Cumulative precipitation for Water Year 2009 (Oct. 1 – Sep.30) for four SNOTEL sites.	21

Tables

	Page
Table 1. Long-term sites used in CAKN analysis.....	3
Table 2. CAKN and Remote Automated Weather Station (RAWS) sites.....	4
Table 3. 2009 monthly average temperature departure from normal (1971-2000) for long-term sites in CAKN.	11
Table 4. Mean monthly and annual temperatures for 2009 from long-term sites compared with 1971-2000 normal period.....	13
Table 5. Monthly mean temperatures from CAKN stations 2009.....	14
Table 6. Mean monthly temperatures for 2009 at high and low elevation paired sites in WRST.	16
Table 7. Mean monthly temperatures for 2009 at high and low elevation paired sites in YUCH and DENA	16
Table 8. Annual precipitation totals - departure from normal 2009.	17
Table 9. Total monthly precipitation at long-term CAKN sites for 2009 compared with 1971-2000 normals	18

Executive Summary

Using methodologies developed for the Central Alaska Network (CAKN), climate was monitored at existing National Weather Service stations and new CAKN climate stations in and around Denali National Park and Preserve, Wrangell -St. Elias National Park and Preserve, and Yukon-Charley Rivers National Preserve. Annual temperatures across the state of Alaska, including the CAKN for 2009, averaged just above normal. The CAKN annual temperatures averaged 0.5°F above normal. Although the average temperatures were near normal there was considerable variation in monthly temperatures. Winter temperatures in 2009 were below average; January temperatures north of the Alaska Range were 3.7 to 6.4 degrees colder than normal, and February temperatures south of the Alaska Range were approximately 4 degrees colder than normal. Spring temperatures started off well below normal from the coast to the interior with March average temperatures ranging from 2 to 9 degrees colder than normal. The average temperatures rebounded in late spring and May was on average 2 degrees warmer than normal. Summer temperatures were 0.9 °F warmer than average, July in particular was warm, with several record breaking monthly temperatures in the region. The autumn season was 1.2°F warmer than the 1971-2000 average. The annual precipitation totals were below normal for most of the CAKN sites, except for Gulkana. July was noticeably dry around the region with precipitation values averaging 1.73 inches below normal.



Introduction

Denali National Park and Preserve, Wrangell–St. Elias National Park and Preserve, and Yukon-Charley Rivers National Preserve make up the Central Alaska Inventory and Monitoring Network (CAKN), covering over 21 million acres. Climate is considered to be the most important broad-scale factor influencing ecosystems. Because global climate models indicate that climate change and variability will be greatest at high latitudes, climate monitoring will be critical to understanding the changing conditions of park ecosystems.

The CAKN climate monitoring program deployed sixteen new climate stations between 2003 and 2005, mostly at higher elevations, to capture elevational and latitudinal climate gradients within the parks, and to capture data in areas where there were no baseline references. The analyses for this annual report are based on the long-term National Weather Service cooperative sites in and around the CAKN parks that have been in operation for 24 to 82 years. The new sites are analyzed for comparison, but long-term trends will take time to develop. This is the fifth in a series of reports for the Central Alaska Network Climate Monitoring Program.

Central Alaska Network Climate Characterization

The central Alaska climate can be characterized by the three major climate regimes that span from the southern boundaries of the network along the coast to the interior. The southern coast of Wrangell-St. Elias is significantly affected by the Gulf of Alaska. The Pacific Ocean moderates the temperature along the coast in both summer and winter, and brings a considerable amount of precipitation to the coastal areas and the southern flanks of the mountain ranges, including the Chugach and St. Elias Ranges that ring the Gulf Coast. Just north of these mountain ranges the precipitation tapers off and seasonal temperatures are more extreme. The winters are cold and the summers can get hot. The CAKN areas farthest north, and the farthest from the coast, are true interior climates characterized by low annual precipitation and large seasonal variation in temperature.

The climate of Alaska is affected by solar radiation, atmospheric gases (volcanic eruptions, CO₂), the water temperature of the Pacific Ocean, and ocean currents. These large scale processes drive changes in atmospheric patterns, like the repositioning of the polar jet stream and the Aleutian low pressure system or the frequency of La Ninas and El Ninos (Papineau, 2003). Each of these can affect the regional patterns of storm tracks, prevailing winds, snowfall amounts, and the extent of sea ice (ACIA, 2004).

There are several large-scale climate patterns and indices that are of particular interest to Alaska, including the Pacific Decadal Oscillation (PDO) which is an index of sea surface temperatures in the North Pacific Ocean. Typical winter sea surface temperatures during the warm phase of the PDO are warmer off of the Gulf Coast of Alaska moderating air temperatures over Alaska (Hartmann and Wendler, 2005; Keen, 2008). The PDO seems to cycle through a warm and cool phase every 20 -30 years. Temperature trends that have shown climatic warming tend to be strongly biased by a sudden shift in 1976 from the cooler regime to a warmer regime (Figure 1).

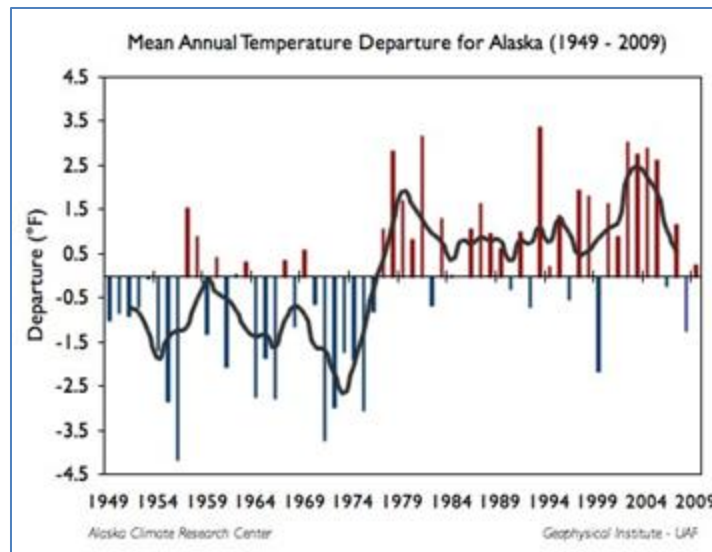


Figure 1. Mean annual temperature departures for Alaska showing the shift to a warmer regime in 1976 that correlates with the PDO. Graph courtesy of the Arctic Climate Research Center, retrieved from <http://climate.gi.alaska.edu/ClimTrends/Change/TempChange.html>.

While the north Pacific seems to explain some of the temperature trends in the region, the Arctic Ocean, and in particular the extent of sea ice will likely influence both temperature and precipitation patterns in Alaska. In recent years there has been a continued significant reduction in the extent of the summer sea ice cover and the decrease in the amount of relatively older, thicker ice (NSIDC, 2009). Models have predicted that the retreating sea ice should affect the temperature and ecosystems of adjacent lands. An increase in the amount of energy absorbed by vegetation and its transfer to the atmosphere, will contribute to the further high-latitude amplification of climate warming (Chapin et al., 2005).

Methods

Data were compiled from seven long-term climate stations with the most complete records nearest the three CAKN parks that represent the major climate regimes in the network (Table 1). These stations have long enough records to compare 2009 data with the latest normal period, 1971-2000. For these sites temperature, precipitation, and snowfall are analyzed. The monthly means are simple arithmetic averages computed by summing the monthly values for the period 1971-2000 and dividing by thirty. Prior to averaging, the data are adjusted if necessary to compensate for data quality issues, station moves or changes in station reporting practices. Missing months are replaced by estimates based on neighboring stations.

Five additional sites are analyzed to try and capture winter temperature inversions and climate deviations at higher elevations (Table 2). Monthly means and annual totals were compiled for the newer CAKN stations including, temperature, wind, relative humidity, solar radiation, snow depth, and summer rainfall (Figure 2). Most of the summaries, analysis, charts, and graphs from NOAA and NRCS are in standard units; in order to standardize units throughout the report data are presented in standard units. Period of record averages for the long-term sites are available in Appendix A, and extremes and records for these sites are listed in Appendix B.

Table 1. Long-term sites used in CAKN analysis.

<i>Name</i>	<i>Lat</i>	<i>Long</i>	<i>Elev. (ft)</i>	<i>Network</i>	<i>Start</i>	<i>End</i>	<i>Park</i>
Eagle	64.7666	-141.2000	850	COOP	1949	Present	YUCH
McKinley Park	63.7195	-148.9656	2060	COOP	1925	Present	DENA
Cantwell	63.4000	-148.9000	2150	COOP	1983	Present	DENA
Talkeetna	62.1800	-150.0600	350	COOP	1949	Present	DENA
McCarthy	61.4166	-143.0000	1250	COOP	1984	Present	WRST
Gulkana	62.1502	-145.4500	1580	SAO	1949	Present	WRST
Yakutat	59.5000	-139.6700	30	SAO	1936	Present	WRST

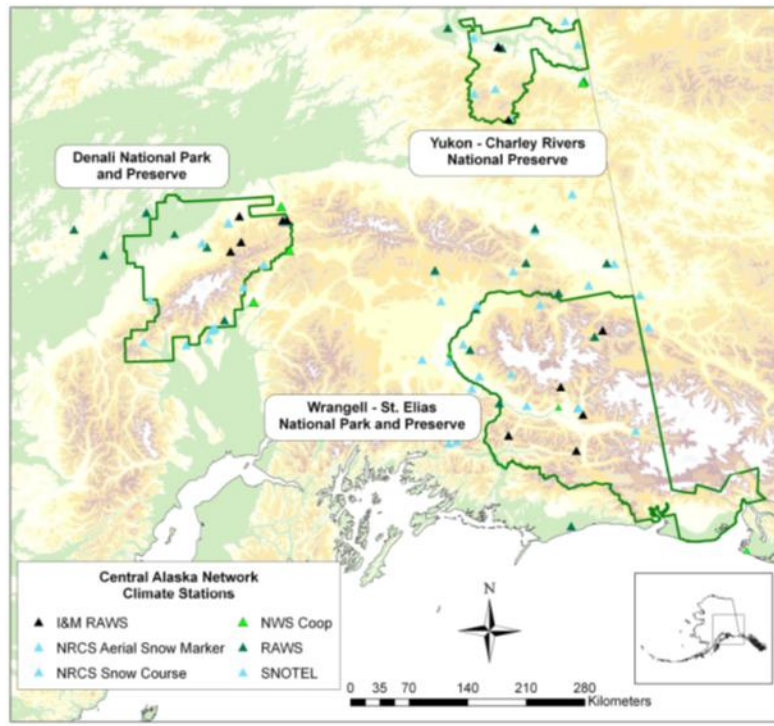


Figure 2. Map of CAKN climate station locations.

Table 2. CAKN and Remote Automated Weather Station (RAWS) sites.

Name	Lat	Long	Elev (ft)	Network	Start	End	Park
Stampede	63.7478	-150.3281	1800	CAKN RAWS	2003	Present	DENA
Toklat	63.5255	-150.0465	2920	CAKN RAWS	2005	Present	DENA
Eielson Visitor Center	63.4307	-150.3102	3730	CAKN RAWS	2005	Present	DENA
Wonder Lake	63.4900	-150.8800	2119	RAWS	1995	Present	DENA
Dunkle Hills	63.2670	-149.5415	2651	CAKN RAWS	2003	Present	DENA
Coal Creek	65.3041	-143.1570	820	CAKN RAWS	2004	Present	YUCH
Upper Charley	64.5169	-143.2023	3654	CAKN RAWS	2005	Present	YUCH
Chicken Creek	62.1240	-141.8473	5260	CAKN RAWS	2004	Present	WRST
Chisana	62.0775	-142.0500	3320	RAWS	1988	Present	WRST
Chititu	61.2735	-142.6209	4554	CAKN RAWS	2004	Present	WRST
May Creek	61.3208	-142.5844	1650	CAKN RAWS	1990	Present	WRST
Gates Glacier	61.6029	-143.0132	4060	CAKN RAWS	2005	Present	WRST
Klawasi	62.1469	-144.9269	3100	RAWS	1991	Present	WRST
Tebay	61.1810	-144.3392	1880	CAKN RAWS	2005	Present	WRST
Tana Knob	60.9080	-142.9013	3739	CAKN RAWS	2005	Present	WRST

Results

Climate Year 2009 Synopsis

The CAKN climate records show that 2009 was slightly warmer and drier at most sites compared to normal. The mean annual temperatures at the longer-term sites averaged 0.5 degrees F warmer than normal. Temperatures were variable across the network from month to month, but the positive departure from normal in July and September stands out, with several record breaking monthly temperatures in the region including McCarthy and Gulkana. McKinley Park recorded the warmest July since 1927. The annual precipitation totals were below normal for most of the sites in CAKN; July was noticeably dry around the region with precipitation values averaging about 1.73 inches below normal. Talkeetna and McKinley Park had annual totals that were 73-75 % below normal. In Yakutat, along the Gulf of Alaska, the annual total was about 36 inches lower than the normal 160 inches per year, or about 77% of normal (Figure 3).

Based on data from January through December, the average annual temperature for the contiguous U.S. was 53.1 degrees F which is 0.3 degrees F above the 20th Century average (NOAA 2010). Annual averaged temperature for Alaska during 2009 was near the long-term mean (Figure 4). Winter temperatures in 2008-2009 were below average. Spring was 0.7°F below average, summer was 0.7 °F warmer than average, and fall was more than 1.4°F warmer than the 1971-2000 average (Figure 5).

The snowpack for the 2008-2009 varied across the state, from record high snowfalls on the Seward Peninsula and in the Southeast Region, to below normal snowpack for the central interior locations. The northeastern area of Wrangell-St. Elias, including the Chisana area and the western area of Denali had snowpacks well above normal, while the eastern portions of Denali, the Chugach Range in Wrangell-St. Elias, and Eagle had snowpacks 20% below normal. For the central Alaska region the snowpack accumulation started around the last week of September with most sites receiving 1-3 inches of snow, after this date snow generally remains on the ground for the rest of the season. Snow off dates for the region ranged between May 1st and May 9th. There was a rapid melt period in late spring due to record high daily temperatures in late April and early May. Figure 6 shows the statewide snowfall development from March through May (NRCS, 2010).

The warm temperatures in April and May sparked an early fire season. The snowpack melted, the ground surface dried out, and convective activity increased. In May, the number of lightning strikes statewide totaled more than 6,500, due to convective activity, most occurring in the interior and southwest Alaska, contributing to an early start to the fire season. By the end of the fire season, 511 fires had burned 2,934,455 acres which is 171% of normal (AICC, 2009).

Two significant events occurred during in 2009. The first was the eruption of Mt. Redoubt in Southwest Alaska in late March that sent powerful ash explosions with plumes of ash between 30,000 to 60,000 feet above sea level across the south central and western interior of the state. The central interior received one of the largest snowfalls of the season just a few days after the first eruptions, blanketing the newly deposited ash with a layer of fresh snow. The second major event was the ice jam flooding on the Yukon River that destroyed much of the low lying areas of

the community of Eagle. Fueled by an above average snowpack in the Upper Yukon region and record high temperatures in early May, the Yukon River breakup created the worst flooding in the area in recorded history. On May 6th, the Yukon River hit its historic high, taking water to approximately 54 feet (AKDOT, 2009).

The El Niño-Southern Oscillation (ENSO) began 2009 in a cold (La Niña) phase. This was expected to persist into early summer, but by April conditions transitioned from the cold phase ENSO (La Niña) to ENSO-neutral conditions. By June 2009, El Niño conditions developed, and persisted through the end of the year; 2009 was recorded as an El Niño year (NOAA 2010). The Pacific Decadal Oscillation, an index of sea surface temperatures in the north Pacific, remained in a negative phase for 23 consecutive months ending in August of 2009, the longest continuous run since the last negative phase in 1976. Mean monthly temperatures for the CAKN region correlate well with this index (JISAO, 2010) (Figure 7). Arctic sea ice extent for September 2009 was 5.36 million square kilometers (2.07 million square miles), the third-lowest in the satellite record (Figure 8).

Globally, 2009 was tied for the second warmest year in the modern record based on the analysis of global surface temperatures by NASA's Goddard Institute for Space Studies (GISS). The past year was only a fraction of a degree cooler than 2005, the warmest year on record, and tied with a number of other recent years including 1998, 2002, 2003, 2006 and 2007, as the second warmest year since recordkeeping began. According to GISS, "January 2000 to December 2009 was the warmest decade on record. Throughout the last three decades, the GISS surface temperature record shows an upward trend of about 0.2°C (0.36°F) per decade" (GISS, 2010).

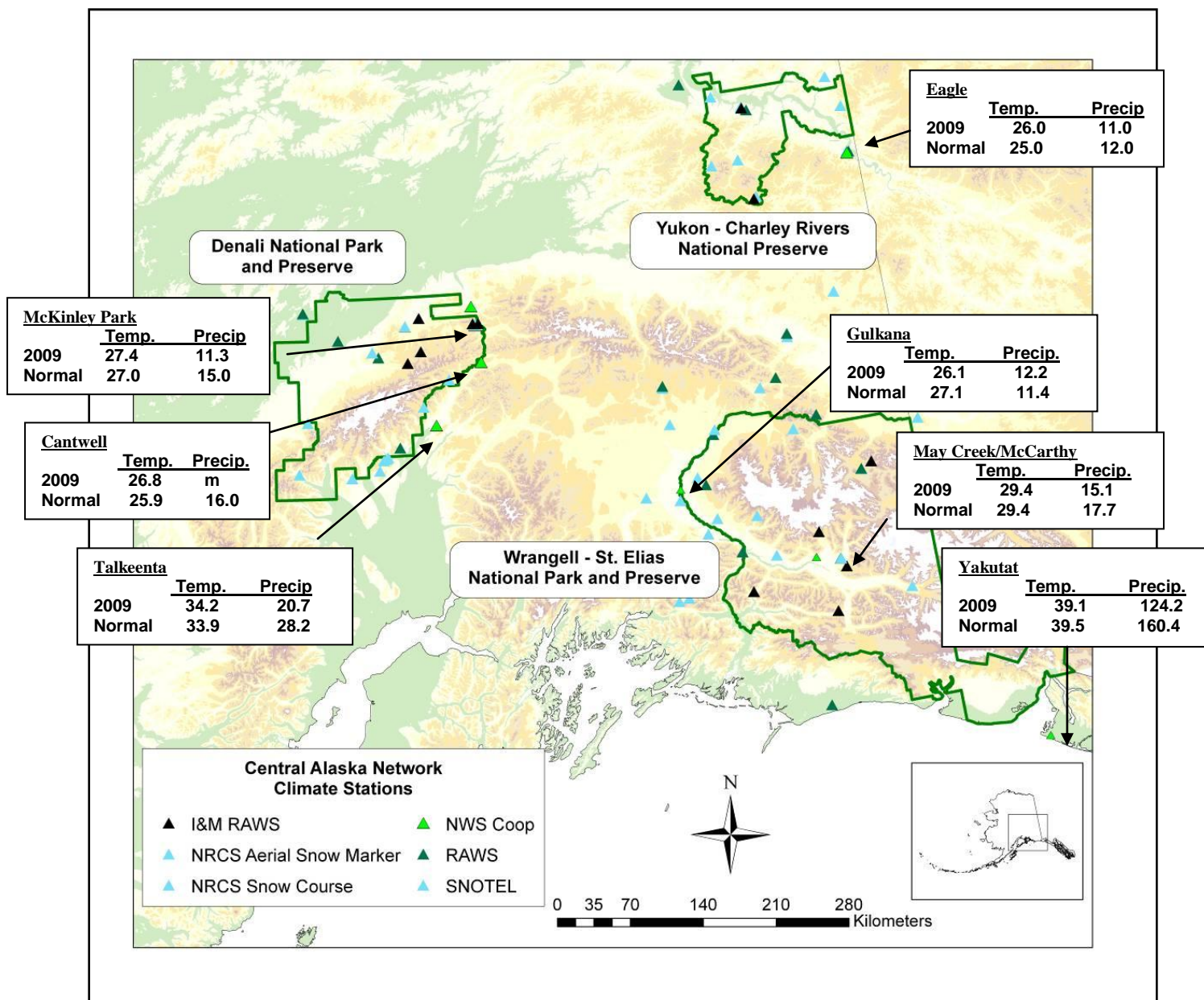
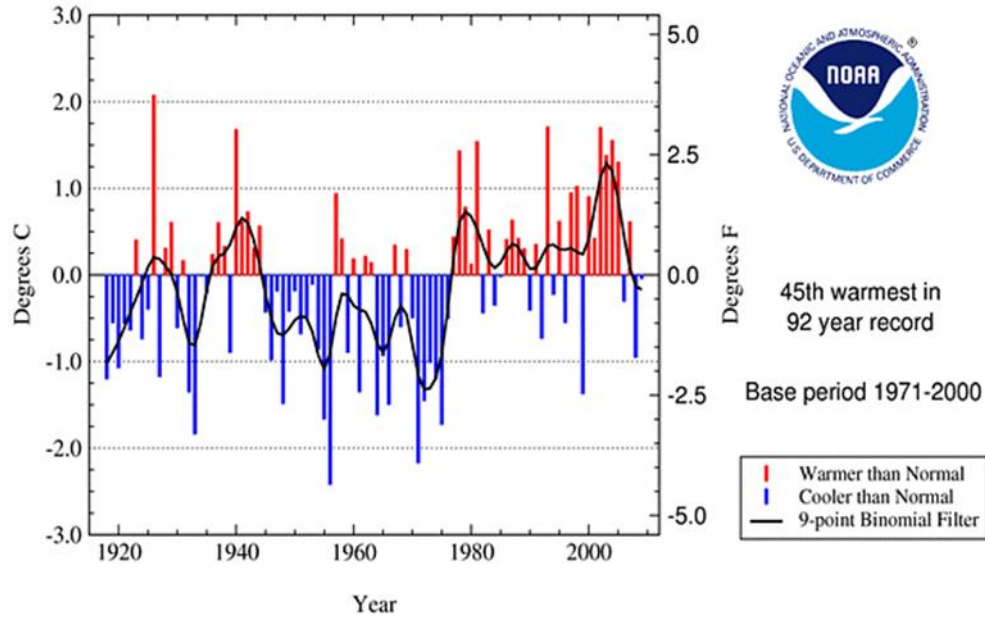


Figure 3. Mean annual temperature and precipitation totals for long-term sites in CAKN for 2009 compared with 1971-2000 normals.

Alaska Statewide Temperature Anomalies

January - December (1918-2009)

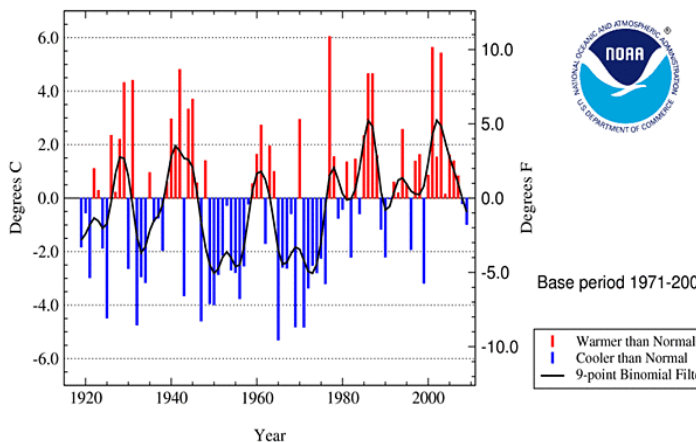


National Climatic Data Center / NESDIS / NOAA

Figure 4. Average temperatures across Alaska were 0.7 ° F below the 1971-2000 mean (NOAA 2010). Figure retrieved from <http://www.ncdc.noaa.gov/sotc/national/2009/13>.

Alaska Statewide Temperature Anomalies

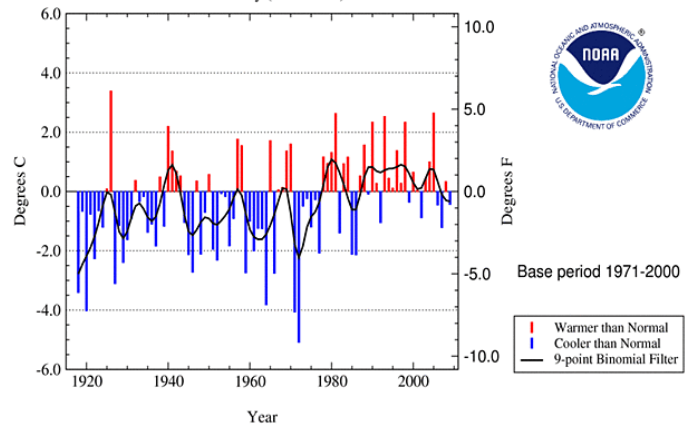
December - February (1918-2009)



National Climatic Data Center / NESDIS / NOAA

Alaska Statewide Temperature Anomalies

March - May (1918-2009)



National Climatic Data Center / NESDIS / NOAA

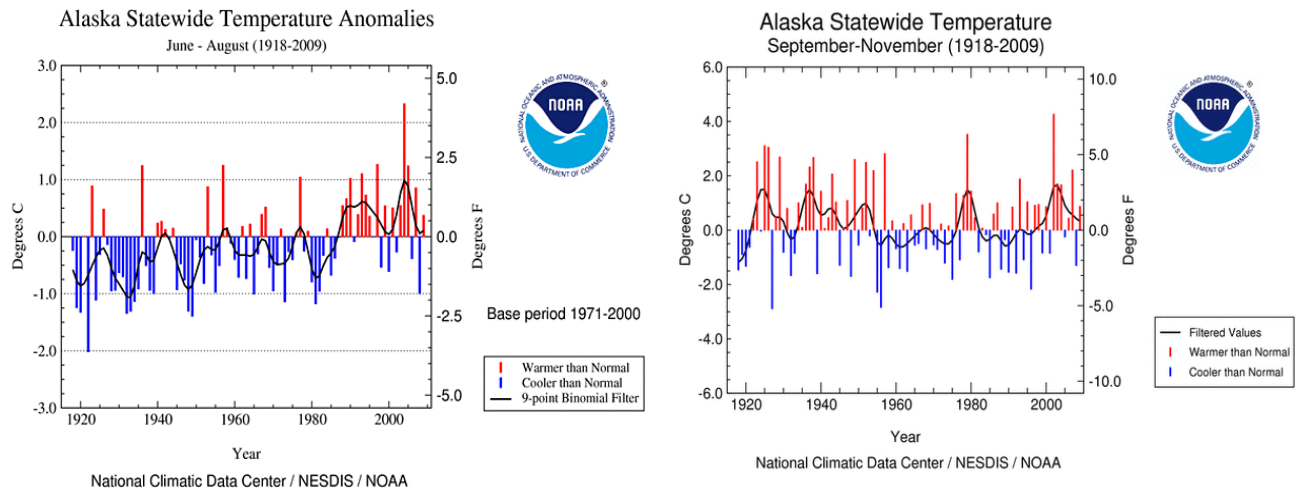


Figure 5. Seasonal statewide temperature anomalies 2009. Figures retrieved from <http://www.ncdc.noaa.gov/sotc/national/2009/13>.

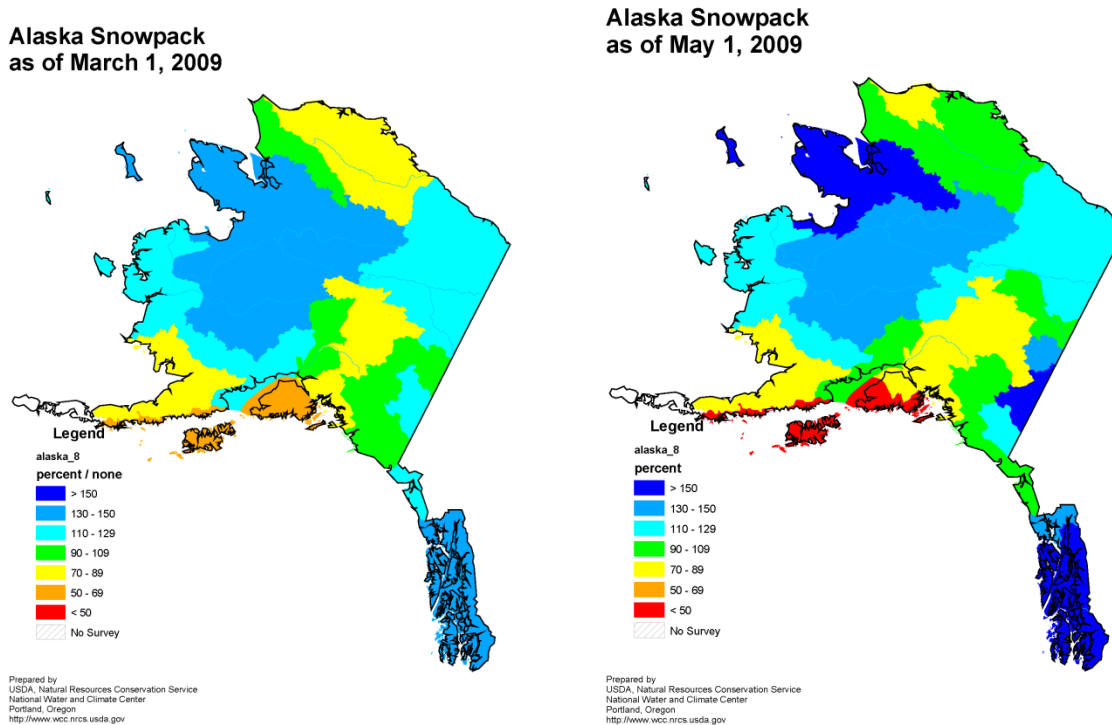


Figure 6. March 1 and May 1 snowpack depths for Alaska 2009 (NRCS 2010).

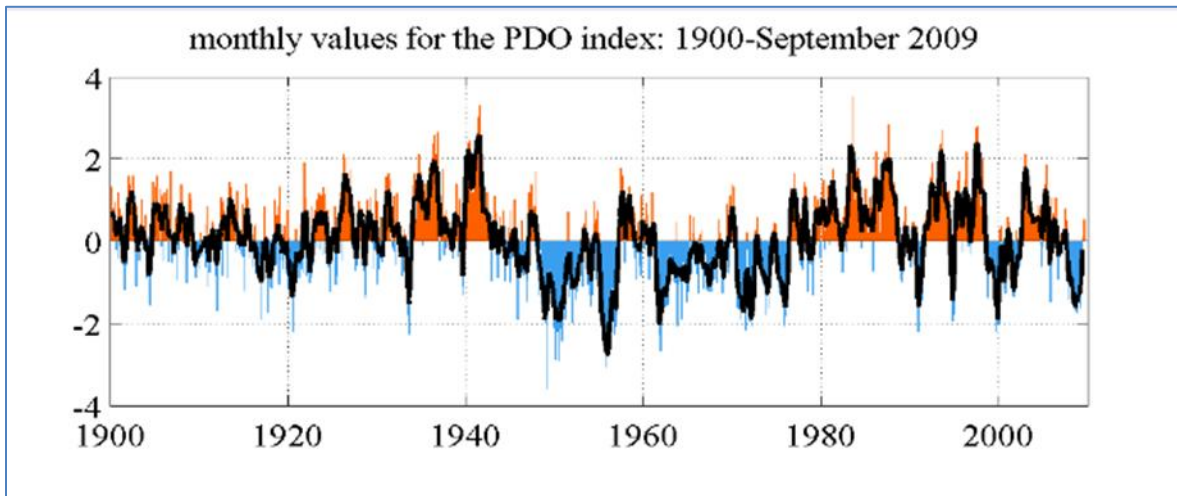


Figure 7. Pacific Decadal Oscillation index. Note the negative departure for 2009. Graph retrieved from <http://jisao.washington.edu/pdo/> (JISAO 2010).

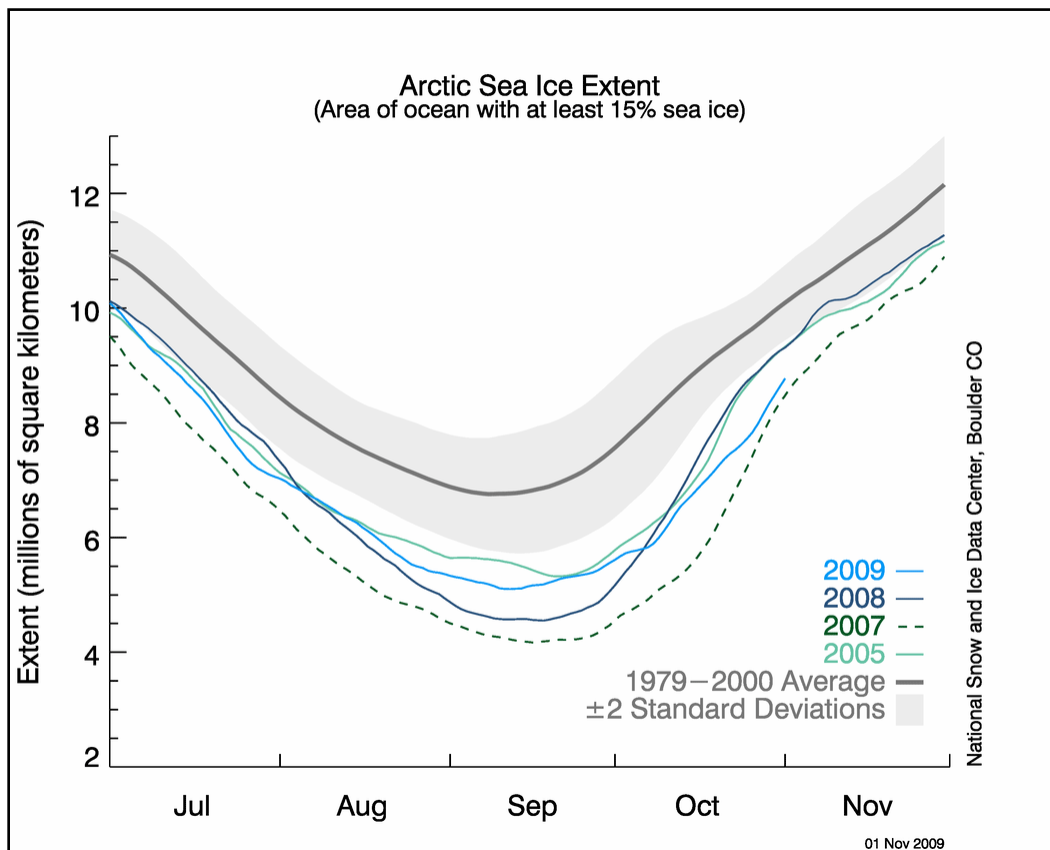


Figure 8. Arctic sea ice extent 2009. This was the third lowest year on record. Graph retrieved from http://nsidc.org/images/arcticseaicenews/20091005_Figure2.png (NSIDC 2010)

Temperature

In 2009 the mean annual temperatures for the long-term sites around the CAKN region averaged 0.5 °F above the 1971-2000 normal for all of the sites except for Yakutat (Figure 10). The temperatures were quite variable through the seasons (Table 3). July, October, and December had the strongest positive temperature departure for these sites. July temperature departures ranged between 1 and 6 degrees warmer than normal, while the October and December departures were as much as 9 degrees above normal for the interior. Although the temperature departure was larger for October and December, July was more noticeable because it occurred in summer where temperature variability is generally not as extreme. The July anomalies were record breaking for McCarthy, Gulkana, Talkeetna, and it was the warmest July since 1927 at McKinley Park (Figure 10). See Appendix A for ‘period of record’ data for the long-term sites and Appendix B for individual site records and extremes.

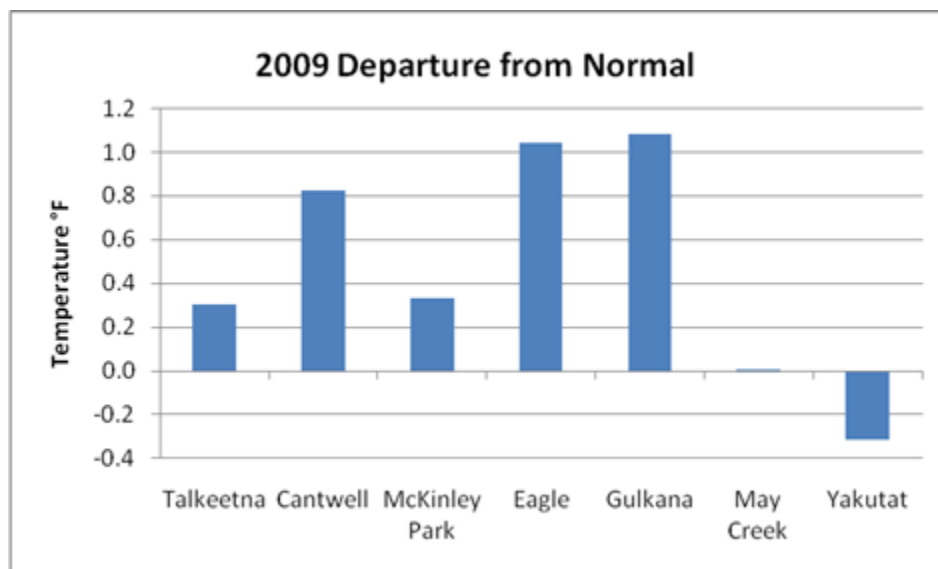


Figure 9. 2009 Mean annual temperature departure from normal at long-term CAKN sites.

Table 3. 2009 monthly average temperature departure from normal (1971-2000) for long-term sites in CAKN.

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Talkeetna	-0.7	-4.8	-1.9	-0.7	2.2	0.4	3.9	-0.5	1.5	6.4	-4.3	2.2	0.3
Cantwell	-6.4	-0.6	-5.6	-1.0	2.7	0.1	6.1	-1.8	2.1	8.0	-2.5	8.8	0.8
McKinley Park	-4.8	1.0	-7.0	-0.4	2.3	-0.2	3.5	-2.2	1.0	8.1	-4.6	7.3	0.3
Eagle	-3.7	4.9	-8.7	3.6	1.6	0.9	0.6	-2.3	1.3	6.1	-0.8	9.0	1.0
Gulkana	1.4	-0.4	-3.8	1.2	3.4	1.1	4.4	-0.6	0.5	5.2	-2.7	3.3	1.1
May Creek	0.7	-4.1	-3.5	0.1	1.6	0.2	4.5	-0.8	0.0	2.4	-4.1	2.9	0.0
Yakutat	2.5	-4.0	-4.1	-2.2	-0.4	0.1	2.2	0.3	0.1	2.0	0.5	-0.8	-0.3

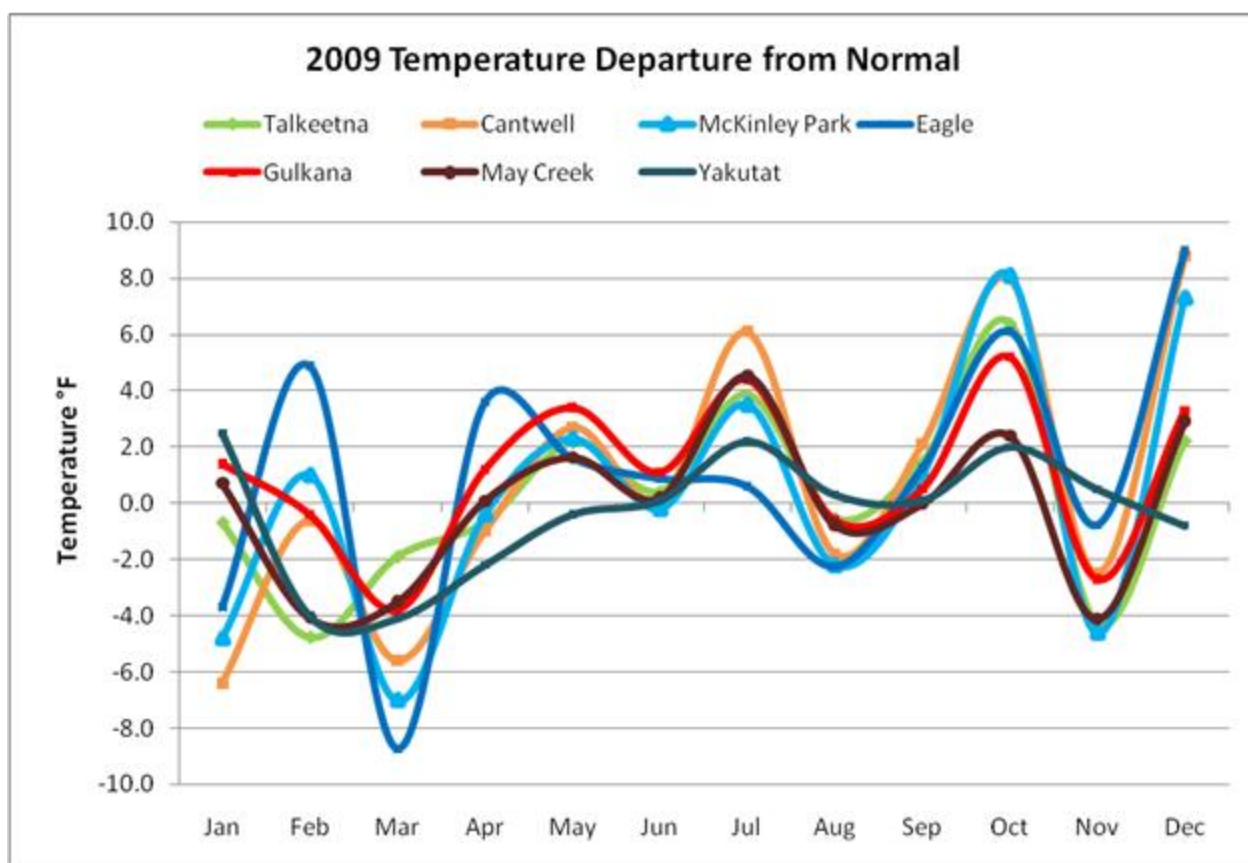


Figure 10. CAKN 2009 mean monthly temperatures departure from normal at long-term sites.

The year started off cold with temperatures below normal for the first half of the month. A wide temperature swing mid-month sent maximum daily temperatures above freezing for a few days; all of the sites except for Yakutat had record breaking high temperatures recorded between January 14 and 18. February was colder than normal south of the Alaska Range and warmer than normal in the interior. March was a cold month at all sites, particularly the interior where Eagle recorded a monthly average 9 degrees colder than normal. April temperatures continued to increase throughout the month as expected ending in near record breaking temperatures during the last few days. May averaged 2 degrees warmer at all sites with record breaking temperatures ushering in the month at Yakutat, Talkeetna, Gulkana, and McCarthy.

The summer of 2009 started off with near normal temperatures in June, followed by the record breaking July, and ending with a cool August. Temperatures rebounded in September to near normal and then kept increasing into October. The monthly average temperatures for October were 2 to 8 degrees warmer than normal. There were record high daily temperatures recorded mid month at McKinley Park, Talkeetna, and McCarthy. Typical winter temperature variability was the norm for the rest of the winter with temperatures in November dipping below normal for all sites except for Yakutat, and December temperatures climbing well above normal and staying there through the first part of January 2010. Table 4 gives the monthly means for the long term sites compared to the latest climate normal period from 1971-2000.

Table 4. Mean monthly and annual temperatures for 2009 from long-term sites compared with 1971-2000 normal period.

Site	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Talkeetna													
2009	10.2	11.3	19.9	33.4	48.0	55.9	62.6	55.0	47.9	38.4	13.8	14.2	34.2
1971-2000 normal	11.0	15.4	22.6	34.3	45.8	55.3	58.9	55.6	46.2	31.4	17.5	13.0	33.9
Cantwell													
2009	-6.6	3.6	7.0	25.0	42.7	50.7	60.8	48.3	42.3	30.7	5.3	11.4	26.8
1971-2000 normal	-0.2	4.2	12.6	26.0	40.0	50.6	54.7	50.1	40.2	22.7	7.8	2.6	25.9
McKinley Park													
2009	-2.8	5.5	6.1	26.8	44.3	52.0	59.1	48.7	41.5	30.6	4.5	12.2	27.4
1971-2000 normal	2.3	4.5	13.1	27.2	42.0	52.2	55.6	50.9	40.5	22.5	9.1	4.9	27.0
Eagle													
2009	-15.3	-1.2	-0.9	32.4	47.6	58.4	61.4	52.6	44.1	29.4	1.4	2.2	26.0
1971-2000 normal	-11.6	-6.1	7.8	28.8	46.0	57.5	60.8	54.8	42.8	23.3	2.2	-6.8	25.0
Gulkana													
2009	-3.3	2.8	11.5	32.3	47.3	54.2	61.4	52.5	43.6	31.6	2.8	1.7	28.2
1971-2000 normal	-4.7	3.2	15.3	31.1	43.9	53.1	57.0	53.1	43.1	26.4	5.5	-1.6	27.1
May Creek													
2009	0.1	5.3	14.4	34.8	47.7	55.5	61.7	52.1	42.3	31.0	4.3	4.0	29.4
*1998-2009 POR	-0.58	9.37	17.9	34.71	46.06	55.3	57.17	52.87	42.32	28.6	8.4	1.08	29.43
Yakutat													
2009	28.3	24.4	27.4	35.0	43.2	49.8	55.8	53.6	48.3	43.1	32.9	27.8	39.1
1971-2000 normal	25.8	28.4	31.5	37.2	43.6	49.7	53.6	53.3	48.2	41.1	32.4	28.6	39.5

*McCarthy site data quality deteriorated in 2009, switched to May Creek RAWS record.

POR =Period of Record.

Yellow – YUCH, Green – DENA, Blue – WRST

Although the new CAKN climate stations and other Remote Automated Weather Stations (RAWS) around the CAKN parks do not have long records, the monthly and annual averages and totals fill in some of the large spatial gaps in the network and offer information on climate patterns related to elevation and topography. Table 5 lists the monthly and annual temperatures for these sites grouped by park and Figure 11 and 12 shows them graphically. The monthly average temperatures are warmer for the lower elevation interior sites during the summer months, while the winter monthly average temperatures are warmer at higher elevations, effectively smoothing the annual averages. See Appendix C for complete monthly summaries from the CAKN climate sites.

Table 5. Monthly mean temperatures from CAKN stations 2009.

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Annual</i>
Stampede	-10.7	4.1	1.6	28.1	44.3	51.7	59.0	48.5	40.1	26.6	-0.5	3.5	24.7
Toklat	1.5	9.3	4.5	24.8	41.9	48.6	56.5	46.7	38.7	29.8	6.2	17.6	27.2
Eielson VC	10.7	13.0	10.4	26.8	40.1	46.4	55.6	45.1	39.7	31.6	11.1	25.2	29.6
Wonder Lake	-4.5	6.5	3.1	26.9	43.0	51.3	59.6	48.6	40.0	26.1	1.0	10.2	26.0
Dunkle Hills	2.7	6.9	8.5	23.8	40.2	47.8	54.9	46.3	40.4	30.7	8.8	15.8	27.2
Denali VC	-4.7	7.3	7.8	29.9	45.8	54.2	61.9	50.5	41.9	30.9	2.6	7.4	28
Coal Creek	-17.8	0.8	-1.7	29.8	48.4	57.7	62.5	51.3	42.7	27.3	-4.2	-2.2	24.6
Upper Charley	-7.2	-1.7	-0.9	25.0	42.3	49.9	56.5	46.3	37.9	24.0	1.8	8.7	23.6
Chicken Creek	3.8	9.5	6.1	23.7	37.0	44.3	52.0	43.8	38.1	26.7	8.5	21.2	26.2
Chisana	-6.6	-2.8	3.5	27.1	43.3	51.9	58.8	50.8	37.4	21.1	-4.9	0.0	23.3
Chititu	m	12.1	11.8	25.8	38.4	45.3	53.1	44.6	40.0	30.4	m	m	m
May Creek	0.1	5.3	14.4	34.8	47.7	55.5	61.7	52.1	42.3	31.0	4.3	4.0	29.4
Gates Glacier	7.1	12.6	13.1	25.6	38.7	45.9	54.1	44.8	40.4	31.8	15.5	23.2	29.4
Klawasi	2.3	8.5	11.9	30.6	44.8	51.3	60.0	50.1	43.2	30.9	9.9	16.7	30.0
Tebay	3.2	9.0	15.6	29.8	43.3	54.5	62.3*	48.6	42.9	34.2	13.0	13.0	30.3

* Missing month – Used nearby Chitina mean July temp as proxy

Yellow – YUCH, Green – DENA, Blue – WRST

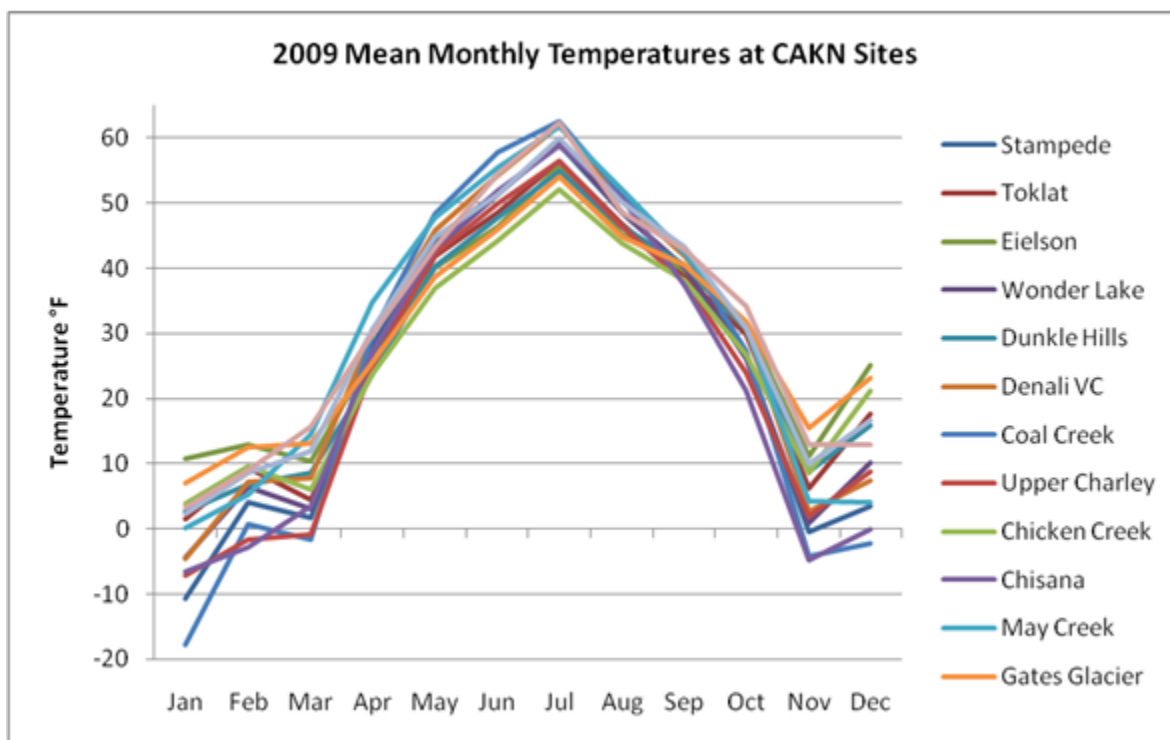


Figure 11. CAKN mean monthly temperatures

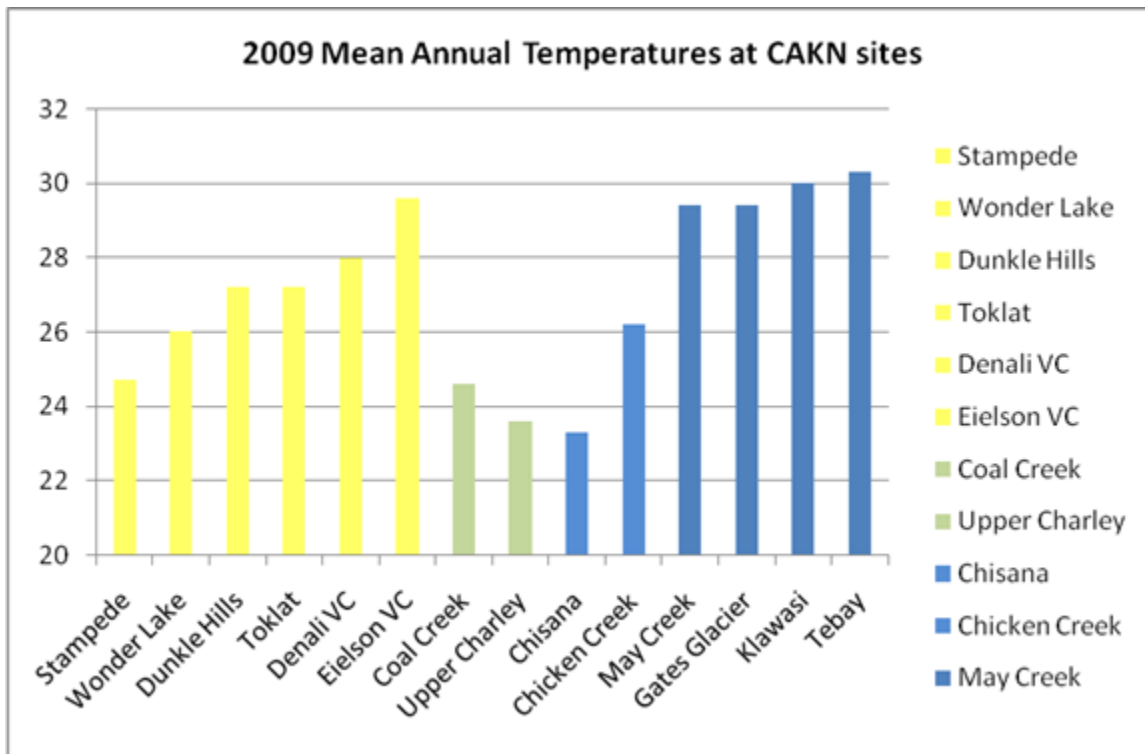


Figure 12. CAKN mean annual temperatures

One of the objectives of the CAKN climate program was to instrument higher elevation sites to acquire information related to temperature gradients in complex topography. In many cases higher sites were deployed in the vicinity of existing lower elevation sites for comparison. Correlations between the paired high and low elevation sites are best described by monthly means rather than annual means. In the summer, the higher sites tend to be 5 to 10° colder depending on the elevation (an increase in elevation lowers the temperature), but in the winter if the air is still and the temperature plummets, the cold air sinks into the valleys and a persistent inversion sets up and the higher elevations can be 10 to 20° F warmer than the surrounding lowlands. The air is often still in the darker winter months due to the lack of solar radiation that generates the surface winds that are so common in the summer. Of course, if a storm system moves in from the Gulf of Alaska or Bering Sea, warm maritime winds (known as Chinooks) often funnel through the mountain passes, raising temperatures and stirring up the air. The areas just north of these mountain passes often get winds in excess of 40 mph during these events.

The following tables show the monthly and annual variation between low and high elevation sites in the three CAKN parks. Table 6 shows Chicken Creek and Chisana, which are sites located in the northern region of WRST in the continental interior, north of the Chugach and Wrangell mountain ranges. The annual temperature was 2.9 degrees warmer at Chicken Creek, the higher site. Table 6 also shows May Creek and Gates Glacier which are located between the Wrangell Mountain Range to the north and the Chugach Range to the south. These sites had the same mean annual temperature. The high sites were warmer in the winter and cooler in the summer, but the winter differences were more extreme.

Table 6. Mean monthly temperatures for 2009 at high and low elevation paired sites in WRST.

Month	Chicken Creek Elev. - 5260'	Chisana Elev. - 3320'		Gates Glacier Elev. - 4060	May Creek Elev. - 1600'
Jan	3.8	-6.6		7.1	0.1
Feb	9.5	-2.8		12.6	5.3
Mar	6.1	3.5		13.1	14.4
Apr	23.7	27.1		25.6	34.8
May	37	43.3		38.7	47.7
Jun	44.3	51.9		45.9	55.5
Jul	52	58.8		54.1	61.7
Aug	43.8	50.8		44.8	52.1
Sep	38.1	37.4		40.4	42.3
Oct	26.7	21.1		31.8	31
Nov	8.5	-4.9		15.5	4.3
Dec	21.2	0		23.2	4
Annual	26.2	23.3		29.4	29.4

Red is warmer temperatures and blue is colder temperatures

Table 7 shows the high and low elevation sites in YUCH. The variation at these two sites is not as extreme as sites farther south. The mean annual temperature at Coal Creek the lower elevation site was 1.0°F warmer than Upper Charley. The Upper Charley site was warmer for each of the winter months, but the spread between the two sites was not as extreme as the WRST examples. In Denali, Eielson Visitor Center is located at a high elevation site just north of the crest of the Alaska Range. This site is compared with Stampede which is located farther north and east, where the topography starts to flatten out (Table 7). The mean annual temperature at Eielson was 4.9°F warmer than Stampede. The monthly average temperatures were warmer in January, February, March, October, November, and December, or 6 out of 12 months. This site is subject to the warm Chinook winds that come through the passes in the winter and is also located above the cold pooling inversion common in the winter. Figure 13 highlights the differences in seasonal temperatures at both high and low elevation sites.

Table 7. Mean monthly temperatures for 2009 at high and low elevation paired sites in YUCH and DENA

Month	Upper Charley Elev. - 3654'	Coal Creek Elev. - 802'		Eielson VC Elev. - 3730'	Stampede Elev. - 1800'
Jan	-7.2	-17.8		10.7	-10.7
Feb	-1.7	0.8		13	4.1
Mar	-0.9	-1.7		10.4	1.6
Apr	25	29.8		26.8	28.1
May	42.3	48.4		40.1	44.3
Jun	49.9	57.7		46.4	51.7
Jul	56.5	62.5		55.6	59
Aug	46.3	51.3		45.1	48.5
Sep	37.9	42.7		39.7	40.1
Oct	24	27.3		31.6	26.6
Nov	1.8	-4.2		11.1	-0.5
Dec	8.7	-2.2		25.2	3.5
Annual	23.6	24.6		29.6	24.7

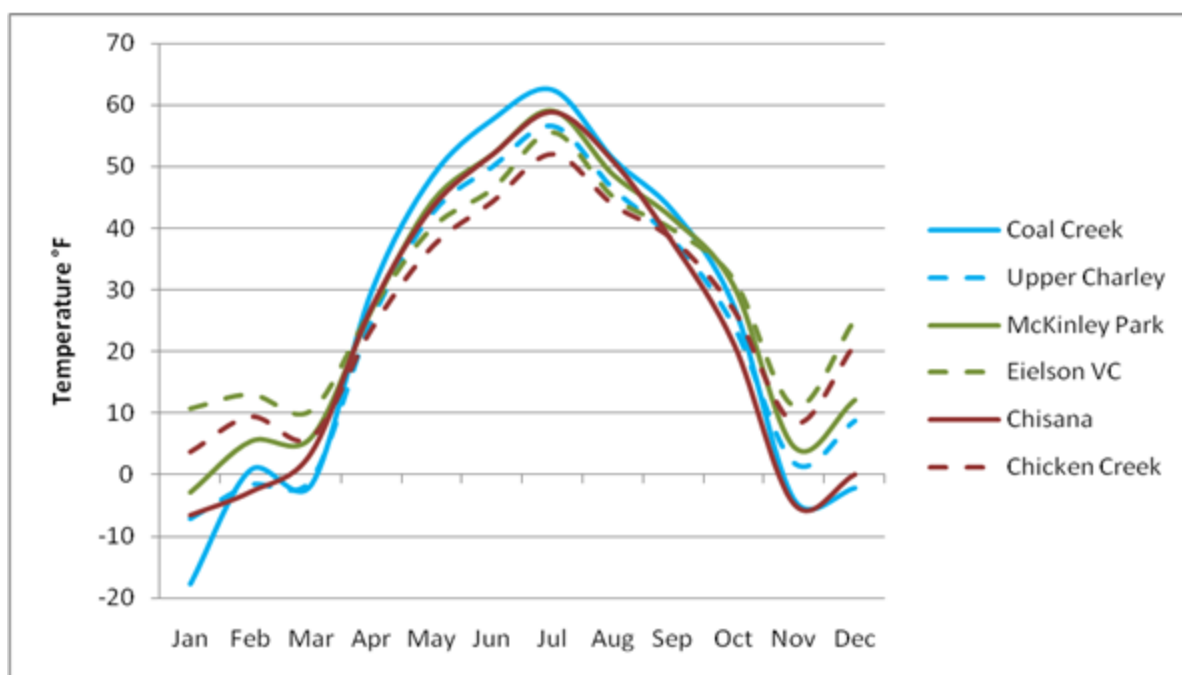


Figure 13. CAKN mean monthly temperatures – Paired high and low elevation sites for 2009.

Precipitation

Annual precipitation totals were below normal for most of the CAKN long-term sites in 2009, except for Eagle and Gulkana which were near normal (Table 8 and Figure 14). July and September were particularly dry months; all of the sites had monthly totals that were 1 to 2+ inches below normal (Figure 13). Eagle had the second wettest June on record, including a daily record on June 27 of 1.36 inches, which was followed by the driest July on record. McCarthy also had the driest July on record. Both Talkeetna and McKinley Park were 73-75% below normal for the year, and McCarthy annual total was 85% of normal (Table 9 and Figure 15). The precipitation amounts for Yakutat are generally five times greater, on average, than the other sites in the network; because of this difference, Yakutat is not included in the figures due to scale issues. Precipitation was above normal in January and August in Yakutat, and below normal for all other months, and ended about 77% of normal for the year. See Appendix B for records for all long-term sites.

Table 8. Annual precipitation totals - departure from normal 2009.

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Talkeetna	0.79	0.47	-0.15	-0.31	0.43	-1.61	-1.63	-0.61	-2.46	-1.46	-0.47	-0.48	-7.49
McKinley Park	0.48	-0.19	0.05	-0.18	0.09	-1.08	-1.82	1.12	-0.84	-0.87	-0.23	-0.22	-3.69
Eagle	-0.23	-0.04	0.11	-0.28	0.41	1.58	-1.81	0.77	0.68	-0.54	0.18	-0.22	-0.97
Gulkana	0.67	0.44	0.15	-0.18	0.28	-0.44	-1.23	1.4	-0.65	-0.45	0.47	0.33	0.79
McCarthy	0.9	0.16	0.53	-0.03	0.22	-0.84	-2.16	1.34	-2.41	-0.11	0.24	-0.42	-2.58
Yakutat	9.45	-5.8	-4.31	-7.49	-7.2	-3.11	-1.69	4.23	-1.67	-13.23	-2.55	-2.85	-36.22

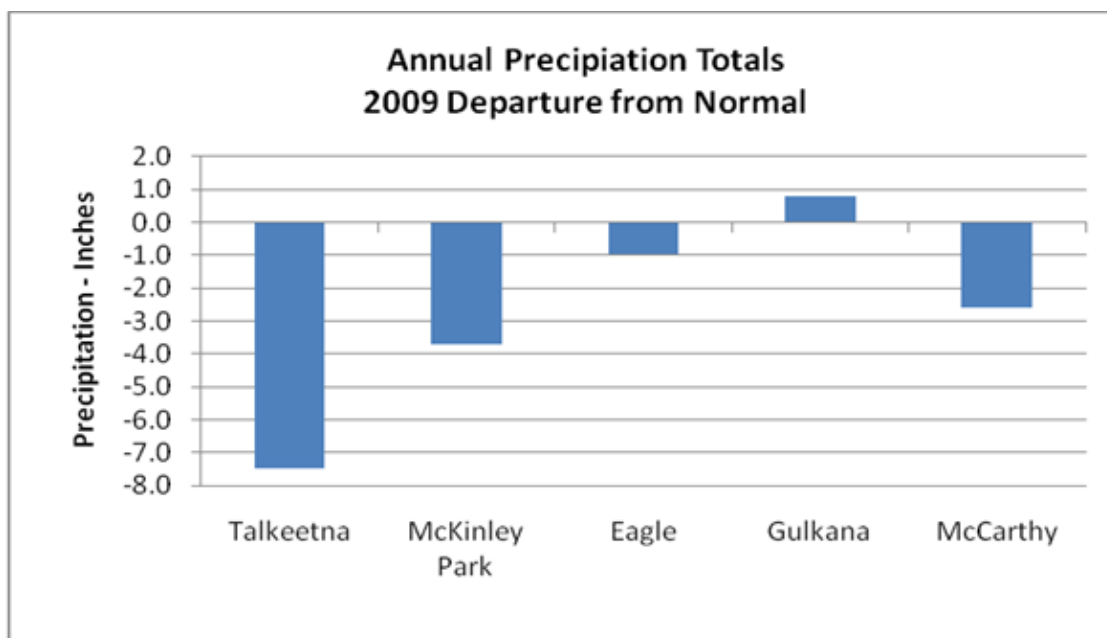


Figure 14. Annual precipitation totals departure from normal for long-term CAKN sites – 2009.

Table 9. Total monthly precipitation at long-term CAKN sites for 2009 compared with 1971-2000 normals

Site	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Talkeetna													
2009	2.24	1.75	1.11	0.91	2.07	0.8	1.61	3.92	1.89	1.6	1.31	1.48	20.69
1971-2000 normal	1.45	1.28	1.26	1.22	1.64	2.41	3.24	4.53	4.35	3.06	1.78	1.96	28.18
McKinley Park													
2009	1.18	0.35	0.43	0.09	0.76	1.14	1.27	3.74	0.92	0.18	0.55	0.67	11.28
1971-2000 normal	0.7	0.54	0.38	0.27	0.67	2.22	3.09	2.62	1.76	1.05	0.78	0.89	14.97
Eagle													
2009	0.21	0.43	0.42	0.02	1.58	3.36	0.32	2.62	1.85	0.43	0.85	0.53	11.04
1971-2000 normal	0.44	0.47	0.31	0.3	1.17	1.78	2.13	1.85	1.17	0.97	0.67	0.75	12.01
Gulkana													
2009	1.12	0.96	0.51	0.04	0.87	1.1	0.59	3.2	0.79	0.57	1.14	1.3	12.19
1971-2000 normal	0.45	0.52	0.36	0.22	0.59	1.54	1.82	1.8	1.44	1.02	0.67	0.97	11.4
McCarthy													
		**										**	
2009	1.9	1	0.93	0.2	0.86	0.96	0.22	3.64	0.44	2.18	1.41	1.4	15.14
1971-2000 normal	1	0.84	0.4	0.23	0.64	1.8	2.38	2.3	2.85	2.29	1.17	1.82	17.72
Yakutat													
2009	22.63	5.19	7.1	3.31	2.58	4.06	6.19	17.5	19.21	10.77	12.62	13	124.16
1971-2000 normal	13.2	11	11.4	10.8	9.78	7.17	7.88	13.3	20.9	24	15.2	15.9	160.4

**McCarthy Feb and Dec values from May Creek SNOTEL

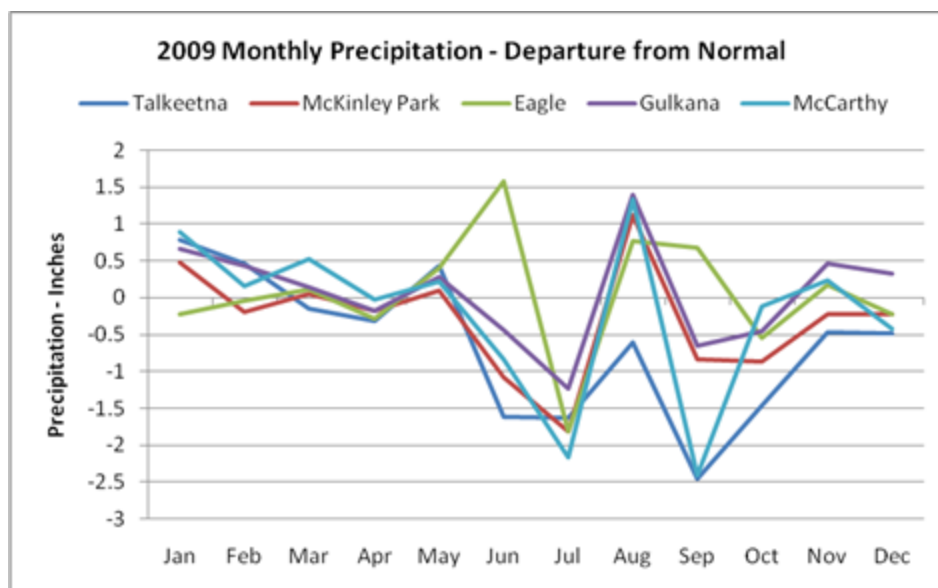


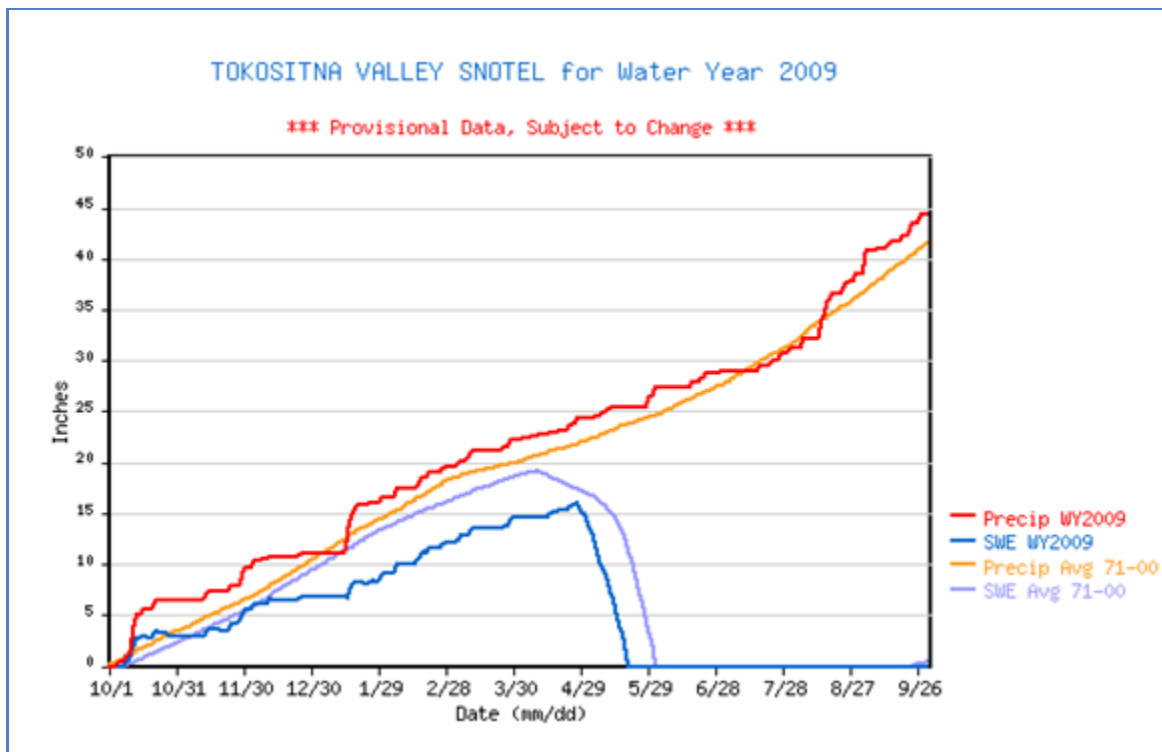
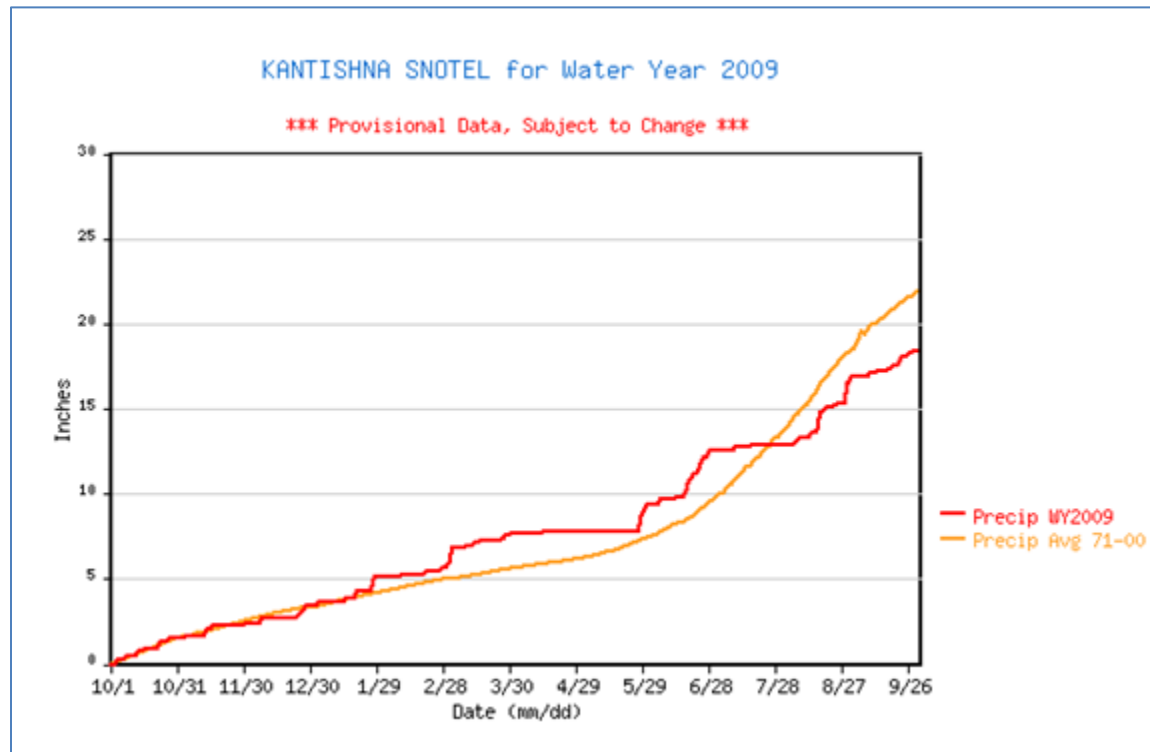
Figure 15. Monthly precipitation totals departure from normal for 2008.

Year round precipitation is recorded at the new snow telemetry (SNOTEL) sites deployed in Denali as part of the CAKN climate and snow program. These new sites provide an accurate representation of winter snow water equivalent at remote sites. The data from these sites, along with the snow courses and aerial markers, surveyed monthly throughout the winter season, are based on the ‘water year’ running from October 1 through September 30. An annual report summarizing the snow and precipitation data from snow courses, aerial markers, and SNOTEL sites around the network is produced in the late fall of each year (Sousanes, 2009). The four new SNOTEL sites in Denali and Wrangell St. Elias. The Mission Creek SNOTEL in Eagle that had been in operation for the past 19 years was destroyed in the Eagle flood in May 2009. There are plans to replace and upgrade the site.

The Kantishna SNOTEL site recorded 7.8 inches of total winter precipitation (snow water equivalent) from October 1, 2008 through May 1, 2009, 42% of the total annual precipitation of 18.5 inches. The precipitation gage at Tokositna Valley recorded 24.3 inches of precipitation from October 1, 2008 through May 1, 2009, which is about 2 inches more than the 1971-2000 normal. This is 55% of the total annual precipitation of 44.4 inches for the 2009 water year.

Since the Mission Creek SNOTEL site was destroyed, water year measurements are not available from the site. On May 5 the total precipitation accumulation for the year was 5.4 inches, or 93% of normal. The SNOTEL site at May Creek reported precipitation, snow water equivalent, and cumulative precipitation. There was 8.4 inches of snow water equivalent on May 1st; the annual total precipitation was 14.2 inches, so the winter snowfall accounted for 60% of the total precipitation for the year. The snow off date was May 5, 2009. The new SNOTEL site at Chisana recorded its first full year of data in 2009. The total annual precipitation was 11.3 inches, the snow water equivalent for the year on May 1 was 4.3 inches, so the winter snowfall accounted for 38% of the annual precipitation total. The snow off date was May 10. Cumulative

precipitation graphs for the four SNOTEL sites are presented in Figure 16 (note the differences in scale).



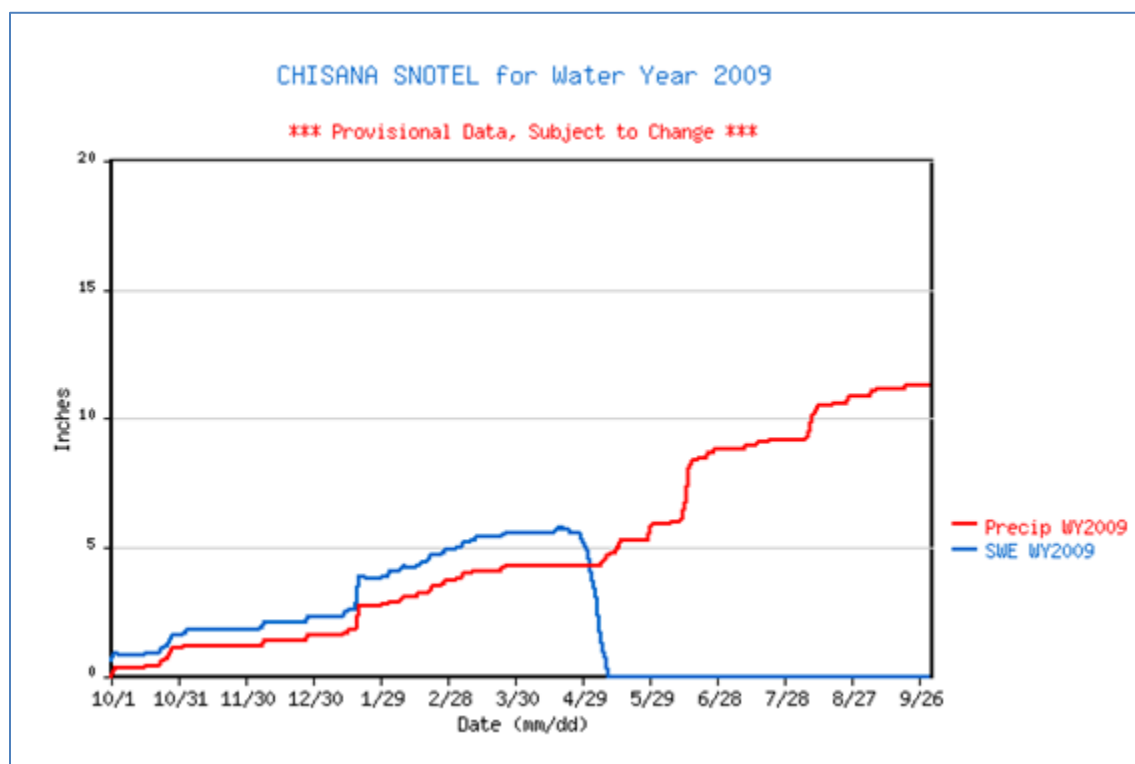
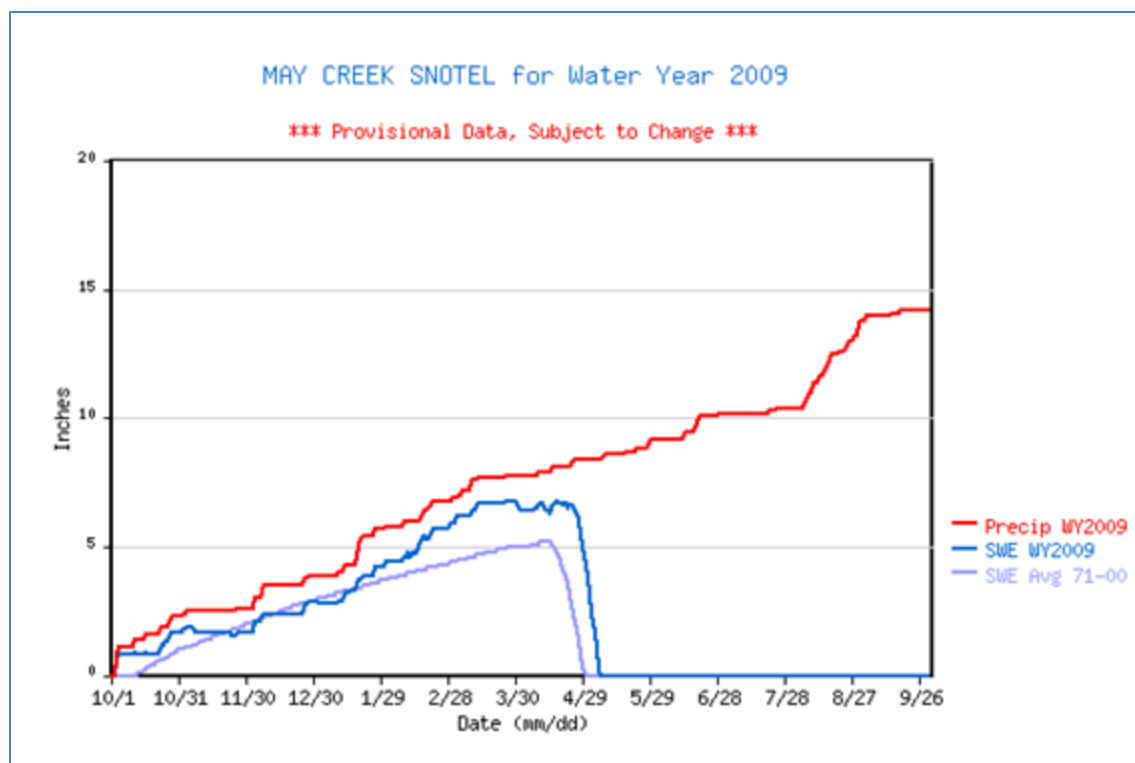


Figure 16. Cumulative precipitation for Water Year 2009 (Oct. 1 – Sep.30) for four SNOTEL sites.

Discussion

The 2009 field season marked the third year of operational climate monitoring within CAKN. Annual maintenance was performed on all climate and snow monitoring instruments in the three CAKN parks. Maintenance included sensor replacement, troubleshooting, upgrades, data downloads, and sensor calibrations. Station maintenance logs were used to keep track of the climate station inventory for DENA, WRST, and YUCH which includes; sensors, data loggers, towers, solar panels, and batteries. Sensor and power performance was tracked and instrumentation was replaced as necessary.

The CAKN climate stations transmit data via satellite and are available on the web at <http://www.wrcc.dri.edu/NPS.html>. Data products that are available on the web include daily and monthly summaries, time series graphs, wind rose graphs, data inventories, and station metadata for all of the automated stations. The data are downloaded from the stations each year and are QA/QC by network staff and sent to WRCC to fill in any gaps from missed satellite transmissions. The raw data are also available for download through the 'data lister' tool on the WRCC website.

An interagency agreement is in place for the maintenance, data archiving, and data dissemination for the four SNOTEL sites in the network. The data from this station are transmitted hourly via meteor burst communication and are on-line at <http://www.ak.nrcs.usda.gov/snow/>.

In 2008, a regional I&M project was initiated with Oregon State University and the PRISM (Parameter-elevation **R**egressions on **I**ndependent **S**lopes **M**odel) group to update climate maps for the Alaska region. The PRISM Climate Group recently completed the spatially gridded average monthly and annual precipitation and temperature data set for the 1971 – 2000 normal period. PRISM is uniquely designed and constantly updated to map climate in difficult situations, including high mountains, rain shadows, temperature inversions, coastal regions, and other complex climatic regimes found throughout the CAKN network. These maps are now available as a GIS raster data layer of 1971-2000 mean monthly and annual precipitation and temperature (average, maximum, minimum). Grid resolution is 30-arc second resolution, which is ~ 0.8 km. This is a significant increase in spatial detail and accuracy, making for highly accurate estimations of point climate values from the gridded data.

This annual report provided a climate summary for the CAKN region in 2009 with brief references to the Alaska regional climate and the global climate. For a graphic display of worldwide significant climate anomalies for 2009 see Appendix D.

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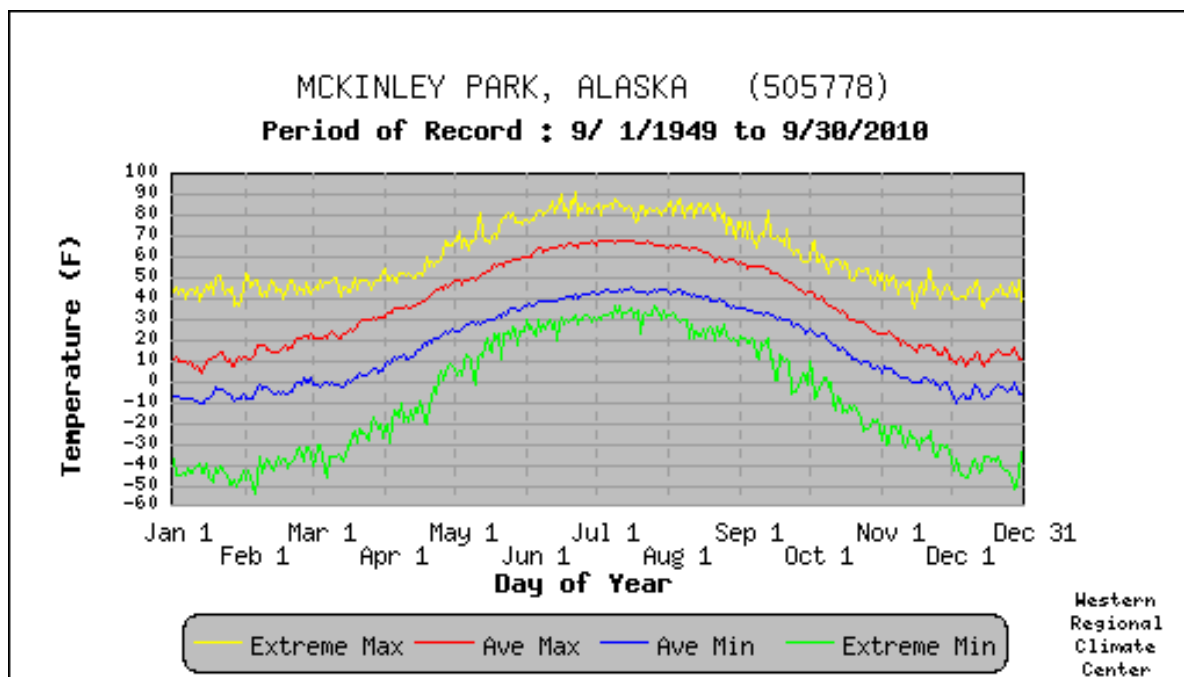
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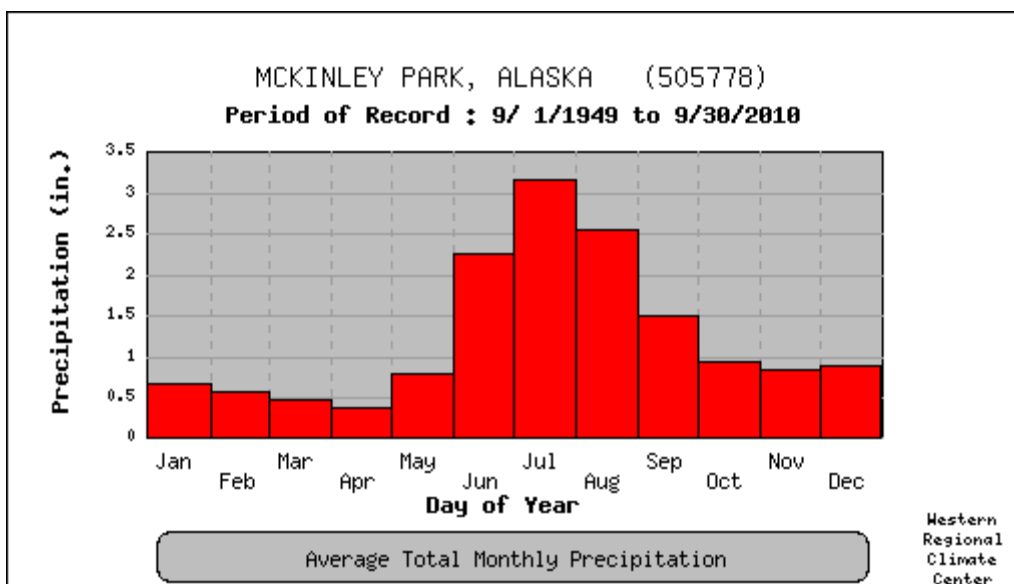
Appendix A: Period of Record Means for Long-term Sites in CAKN

McKinley Park Period of Record Monthly Climate Summary

Period of Record: 9/ 1/1949 to 9/30/2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	9.4	16.1	24.9	38.7	53.6	64.2	66.4	61.5	50.7	32.3	17.5	11.3	37.2
Average Min. Temperature (F)	-7.6	-4.2	0.7	15.7	29.9	39.7	43.4	40.0	30.5	14.3	0.9	-5.5	16.5
Average Total Precipitation (in.)	0.7	0.6	0.5	0.4	0.8	2.3	3.2	2.6	1.6	0.9	0.8	0.9	15.2
Average Total Snow Fall (in.)	10.3	9.6	7.8	5.3	2.9	0.3	0.0	0.0	4.2	12.5	13.2	13.4	79.6
Average Snow Depth (in.)	17.0	20.0	21.0	17.0	2.0	0.0	0.0	0.0	1.0	3.0	8.0	13.0	8.0



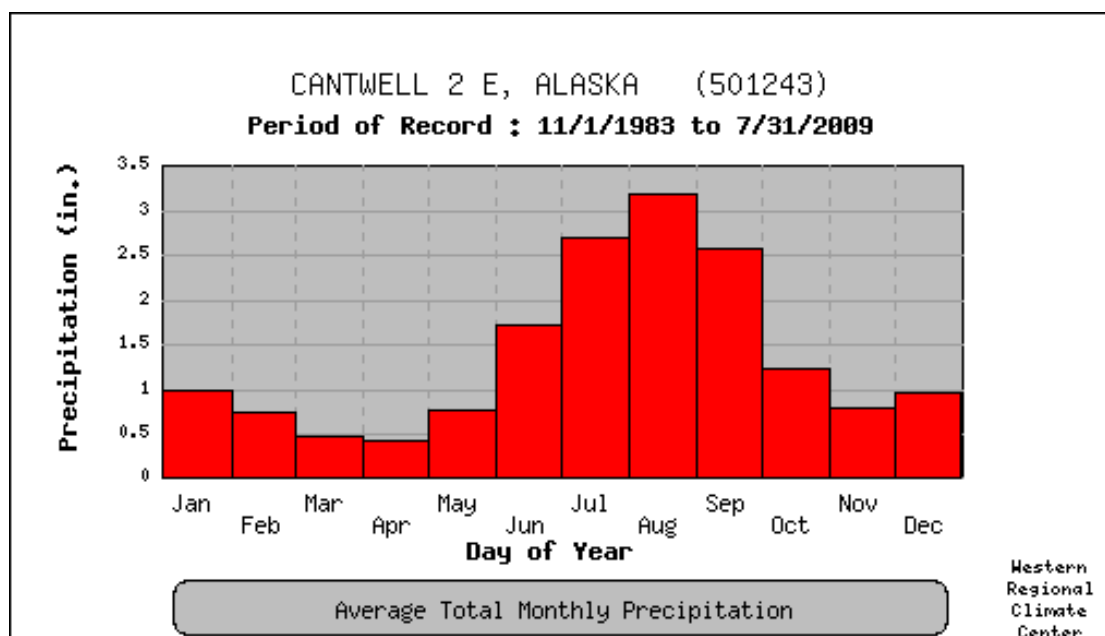
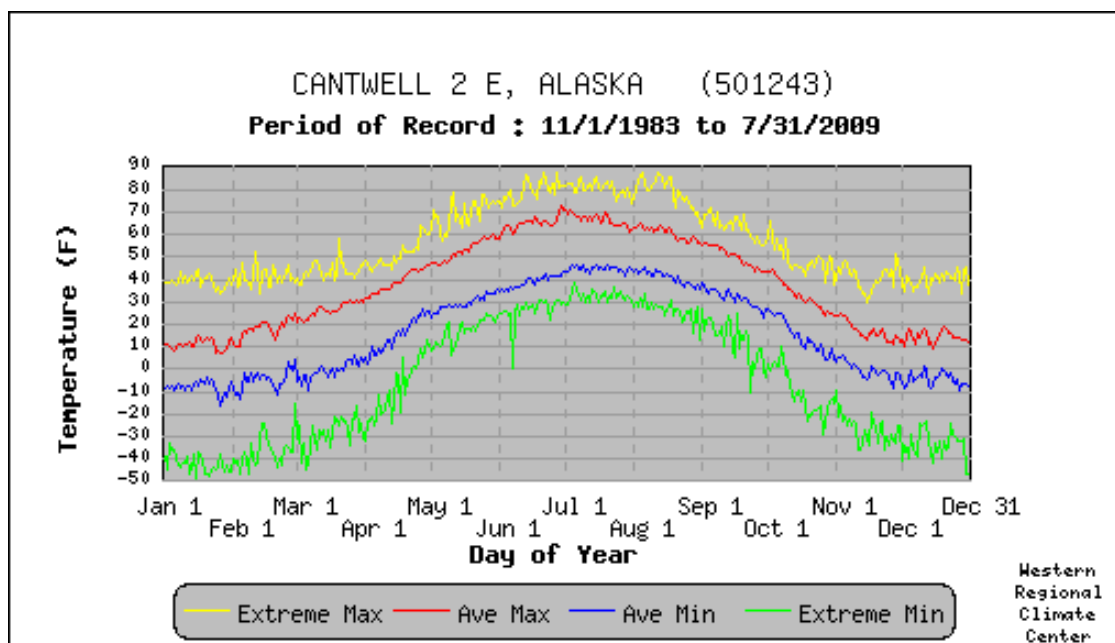


Cantwell Period of Record Monthly Climate Summary

Period of Record : 11/1/1983 to 7/31/2009

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	10.7	17.5	25.6	38.5	52.7	64.8	66.0	60.5	49.7	32.2	16.8	14.3	37.4
Average Min. Temperature (F)	-8.8	-5.5	-1.0	14.6	28.8	38.2	44.2	40.3	30.9	14.3	-0.8	-5.0	15.9
Average Total Precipitation (in.)	1.0	0.8	0.5	0.4	0.8	1.7	2.7	3.2	2.6	1.2	0.8	1.0	16.6
Average Total Snow Fall (in.)	22.3	15.8	12.7	10.8	5.2	0.2	0.3	0.0	4.0	16.2	17.9	20.5	125.7
Average Snow Depth (in.)	24.0	28.0	29.0	21.0	3.0	0.0	0.0	0.0	0.0	3.0	9.0	15.0	11.0

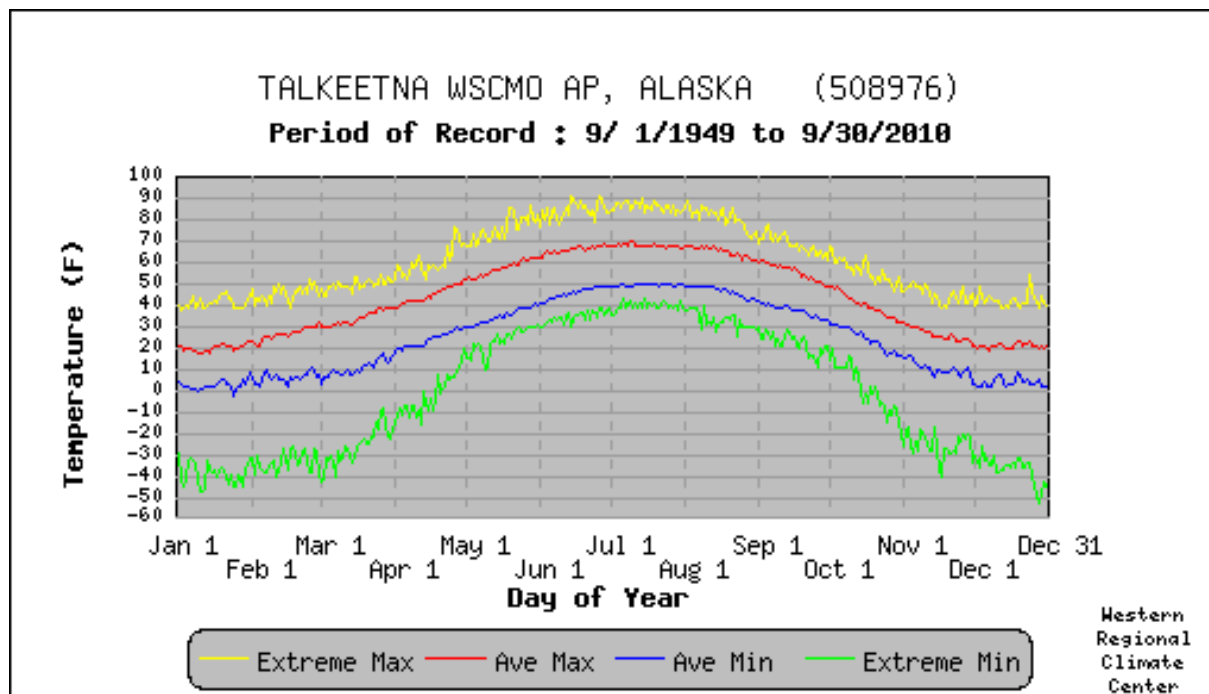
* Note: After July 2009, this site was effectively closed. Another site @ 2 miles west of this site is now in operation.

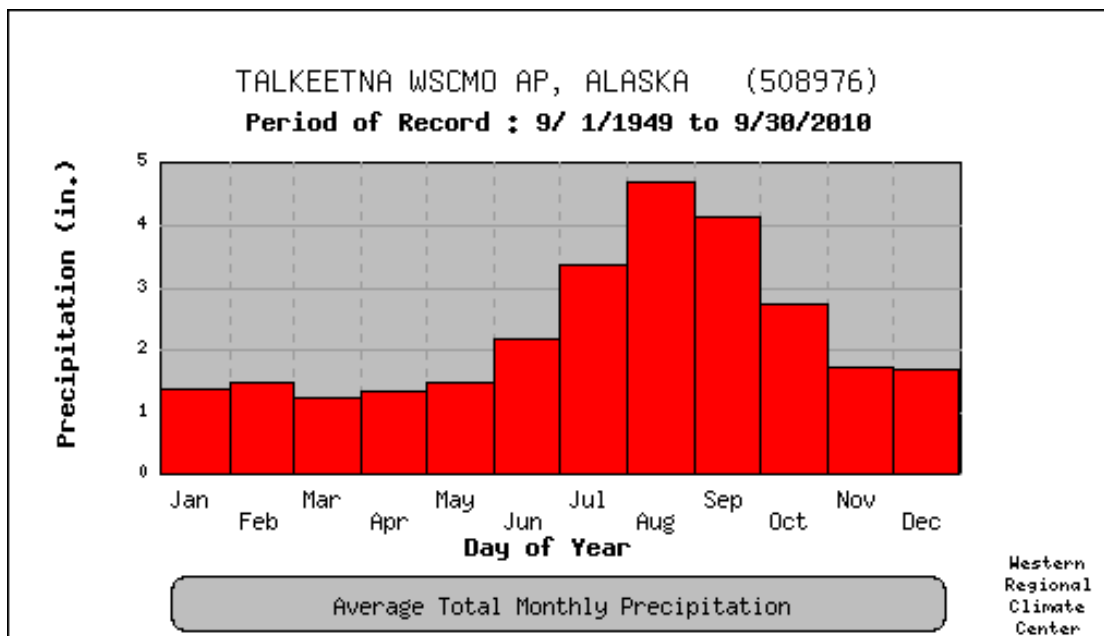


Talkeetna Period of Record Monthly Climate Summary

Period of Record: 9/ 1/1949 to 9/30/2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	19.7	26.1	33.6	44.7	57.0	65.7	67.9	64.7	55.5	39.9	26.2	20.4	43.4
Average Min. Temperature (F)	2.0	5.8	10.0	23.5	34.7	45.3	49.6	46.4	37.3	24.0	9.9	3.5	24.3
Average Total Precipitation (in.)	1.4	1.5	1.3	1.4	1.5	2.2	3.4	4.7	4.2	2.8	1.7	1.7	27.6
Average Total Snow Fall (in.)	18.6	20.0	17.1	9.2	0.9	0.0	0.0	0.0	1.2	11.6	19.2	22.8	120.6
Average Snow Depth (in.)	27.0	30.0	31.0	18.0	2.0	0.0	0.0	0.0	0.0	2.0	8.0	17.0	11.0

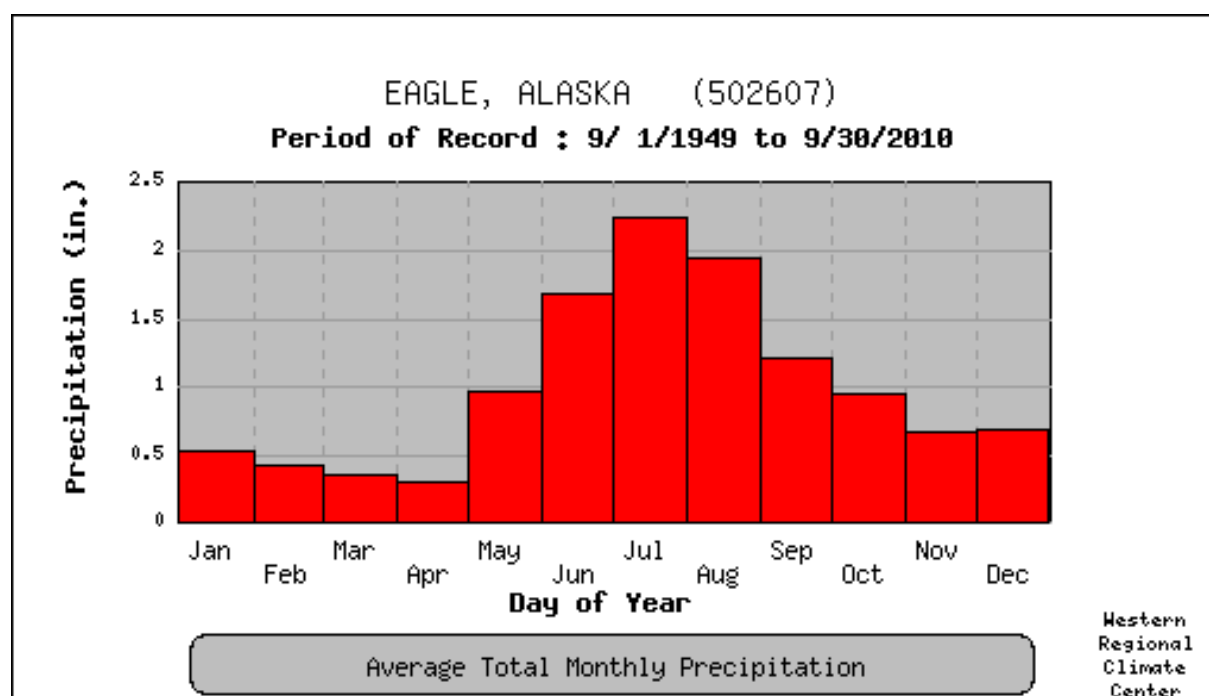
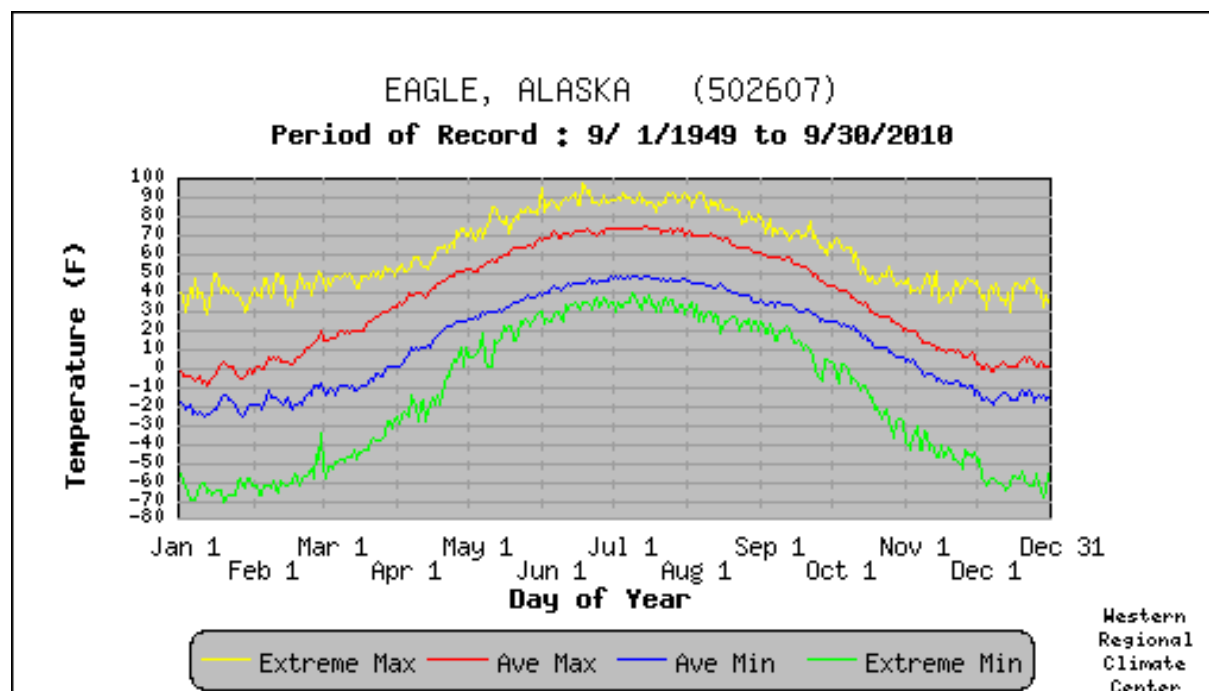




Eagle Period of Record Monthly Climate Summary

Period of Record: 9/ 1/1949 to 9/30/2010

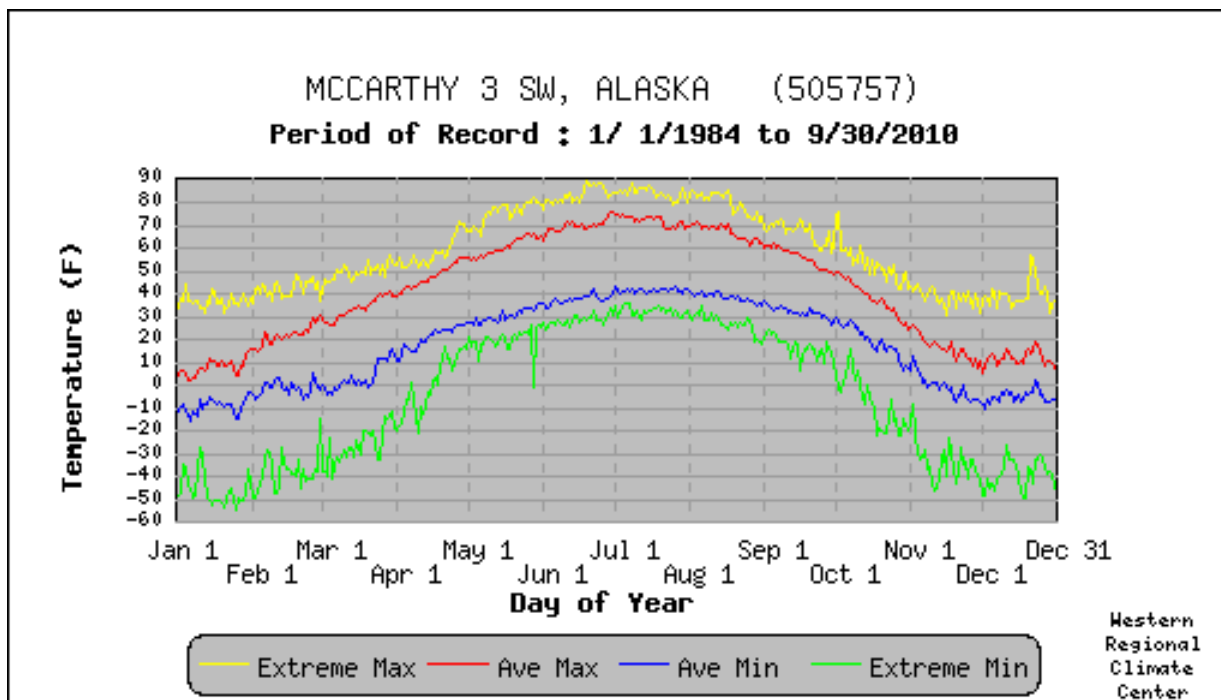
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	-3.7	5.3	22.0	42.2	59.1	70.9	72.9	66.8	53.7	32.1	11.4	1.4	36.2
Average Min. Temperature (F)	-21.3	-16.9	-8.0	14.3	31.9	43.8	47.1	41.1	30.7	15.0	-5.0	-15.5	13.1
Average Total Precipitation (in.)	0.5	0.4	0.4	0.3	1.0	1.7	2.3	2.0	1.3	1.0	0.7	0.7	12.1
Average Total Snow Fall (in.)	7.7	6.9	5.3	3.1	0.8	0.0	0.0	0.0	0.9	9.6	10.7	11.3	56.1
Average Snow Depth (in.)	17.0	20.0	20.0	13.0	0.0	0.0	0.0	0.0	0.0	3.0	8.0	13.0	8.0

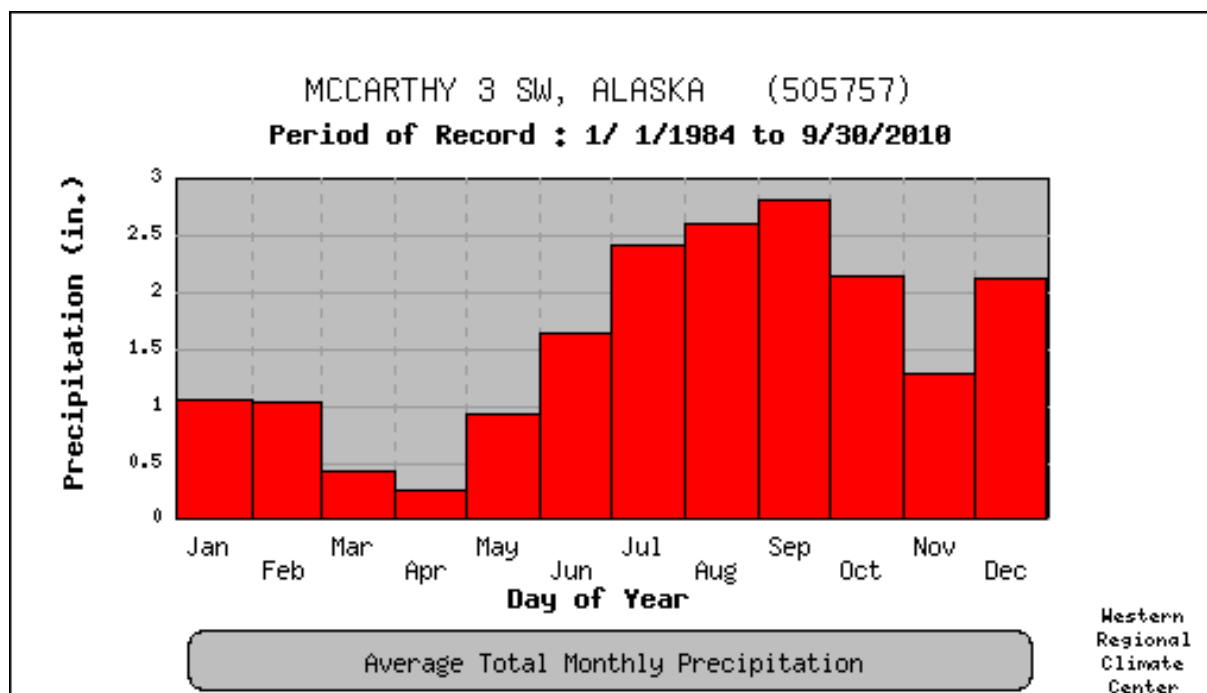


McCarthy Period of Record Monthly Climate Summary

Period of Record: 1/ 1/1984 to 9/30/2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	8.4	21.0	33.2	47.3	60.2	69.3	71.6	66.7	55.7	37.8	16.5	12.5	41.7
Average Min. Temperature (F)	-8.9	-2.1	3.2	20.3	29.8	37.5	41.4	38.3	31.3	19.0	-1.1	-4.1	17.0
Average Total Precipitation (in.)	1.1	1.0	0.4	0.3	1.0	1.6	2.4	2.6	2.8	2.2	1.3	2.1	18.8
Average Total Snow Fall (in.)	12.6	8.6	5.5	2.6	0.2	0.0	0.0	0.0	2.6	10.2	13.5	12.4	68.1
Average Snow Depth (in.)	17.0	21.0	23.0	13.0	0.0	0.0	0.0	0.0	0.0	2.0	8.0	13.0	8.0



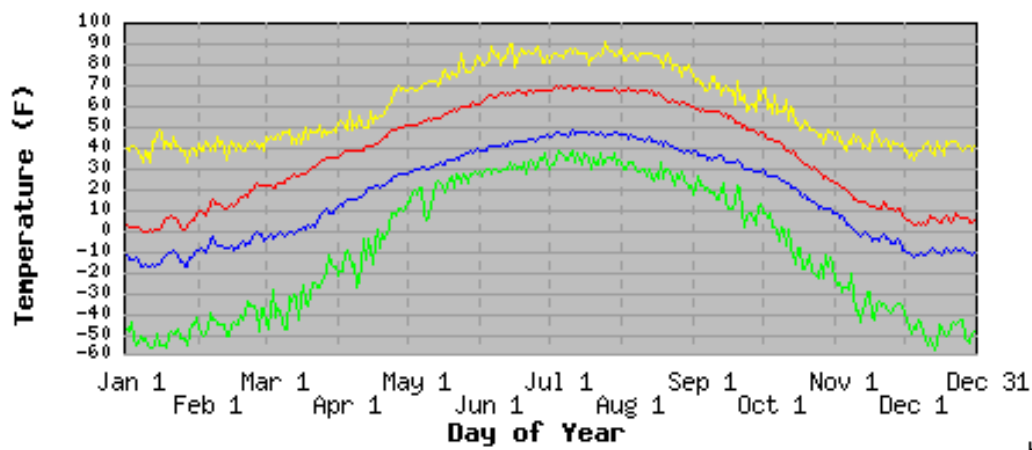


Gulkana Period of Record Monthly Climate Summary

Period of Record: 9/ 1/1949 to 9/30/2010

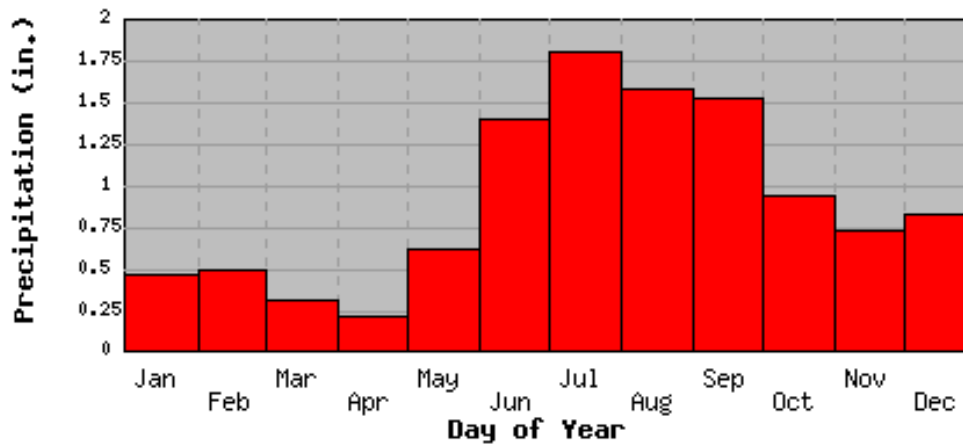
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	2.5	14.2	27.9	42.3	55.7	65.7	68.5	64.8	53.9	35.2	14.1	5.1	37.5
Average Min. Temperature (F)	-14.0	-6.8	1.7	19.8	32.9	42.3	46.3	42.3	33.1	18.6	-1.4	-10.7	17.0
Average Total Precipitation (in.)	0.5	0.5	0.3	0.2	0.6	1.4	1.8	1.6	1.5	1.0	0.7	0.8	11.0
Average Total Snow Fall (in.)	7.1	7.6	5.0	2.6	0.5	0.0	0.0	0.1	1.1	8.0	8.9	10.3	51.2
Average Snow Depth (in.)	14.0	16.0	14.0	5.0	0.0	0.0	0.0	0.0	0.0	2.0	6.0	11.0	6.0

GULKANA FAA/AMOS, ALASKA (503465)
 Period of Record : 9/ 1/1949 to 9/30/2010



Western
Regional
Climate
Center

GULKANA FAA/AMOS, ALASKA (503465)
 Period of Record : 9/ 1/1949 to 9/30/2010



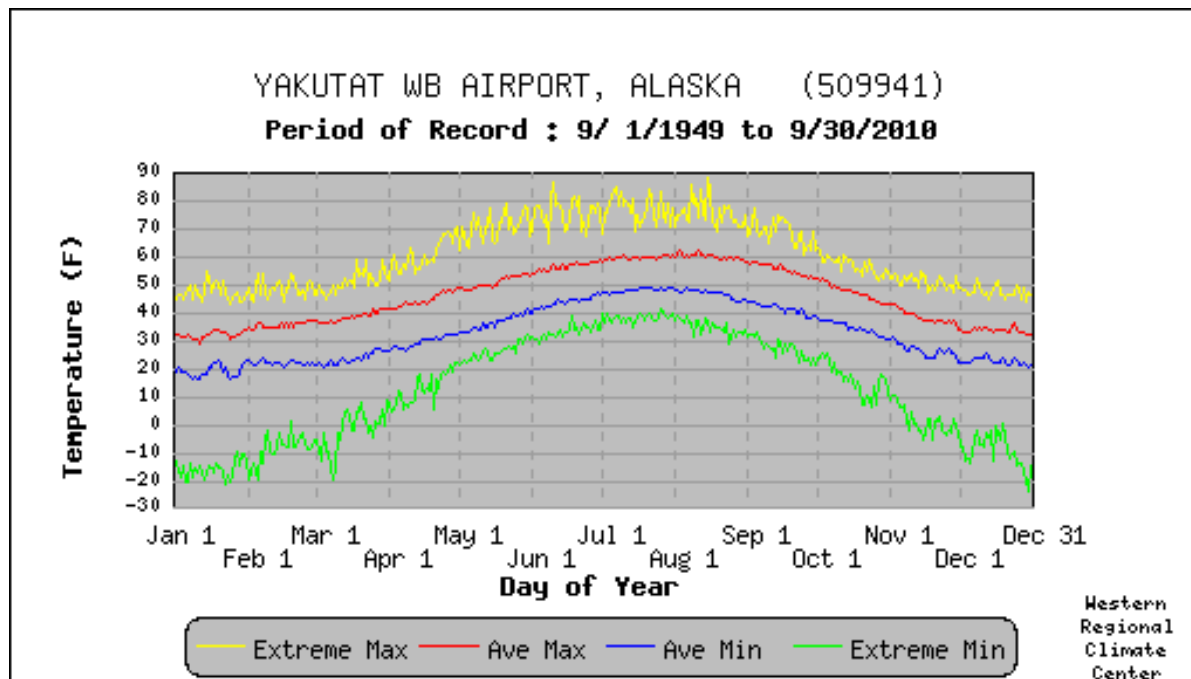
Average Total Monthly Precipitation

Western
Regional
Climate
Center

Yakutat Period of Record Monthly Climate Summary

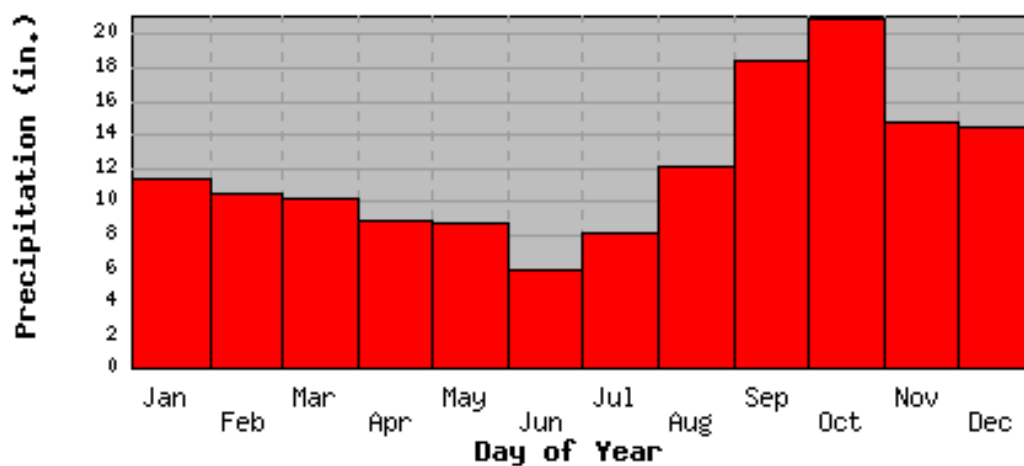
Period of Record: 9/ 1/1949 to 9/30/2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	31.7	35.5	38.4	44.4	50.9	56.5	59.8	60.2	55.5	47.3	38.4	33.8	46.0
Average Min. Temperature (F)	18.9	21.8	23.3	29.3	36.5	43.8	48.1	46.8	41.3	34.5	26.3	22.4	32.7
Average Total Precipitation (in.)	11.4	10.3	10.2	8.9	8.7	6.0	8.1	12.1	18.4	20.9	14.8	14.5	144.1
Average Total Snow Fall (in.)	35.1	34.9	36.8	15.1	1.0	0.0	0.0	0.0	0.0	4.8	21.1	35.7	184.5
Average Snow Depth (in.)	14.0	16.0	20.0	11.0	1.0	0.0	0.0	0.0	0.0	0.0	3.0	9.0	6.0



YAKUTAT WB AIRPORT, ALASKA (509941)

Period of Record : 9/ 1/1949 to 9/30/2010



Average Total Monthly Precipitation

Western
Regional
Climate
Center

Appendix B: 2009 Extremes at Long-term CAKN Sites

Daily summary stats retrieved from:

<http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ak5778>

Monthly summary stats retrieved from:

<http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ak5778>

McKinley Park - 2009 Records – 85 years

Record High Temperatures °F	46, 47	Jan 15, 17
	83, 88	July 8, 9
	83	July 14
	69, 64	Sep 6, 8
	57, 59, 59	Oct 11-13
. Record Low Temperatures °F	-26, -24	Mar 18, 19
	32	Aug 2
	25	Aug 20
	-28, -29	Nov 18, 19
Record High Precipitation – In	1.23	Aug 31
Warmest July*** on record	59.1	July

*** Warmest July since digital records have been kept 1949-present, but the monthly mean in July 1927 was 60°F

Talkeetna – 2009 Records – 59 years

Record High Temperatures °F	42	Jan 16
	67, 68, 67	May 1-3
	81	May 26
	81	June 10
	89	July 7
	59	Oct 12
	49	Dec 3
Record Low temperatures °F	34	June 25
	37	Aug 2

Cantwell – 2009 records – 26 years

Record High Temperatures °F	42, 44	Jan 15-16
	39	Jan 18
	78, 78, 83, 85	Jul 5-8
	82	Jul 12
Record Low temperatures °F	-39	Jan 1
	-36	Jan 4
	-40, -43, -44, -42, -42, -39	Jan 7-11
	-26	Mar 8
	18, 18	May 17 -18

Eagle – 2009 Records -54 years

Record High Temperatures °F	46, 40	Jan 17, 18
Record Precipitation – In.	1.36	June 27
Driest July on Record	0.32	July

McCarthy 2009 Records – 24 years of data

Record high Temperatures °F	35	Jan 14
	67, 69	May 2,3
	76, 81, 81, 80	June 1-4
	81, 80, 83, 82	June 8-11
	85, 83, 85, 88	July 5- 8
	86	July 13
	82, 86, 82	July 29-30
	71, 70	Sept 6-7
	50	Oct 13
Record Low Temperatures °F	-48	Jan 1
	-45, -49	Jan 6-7
	-27	Jan 10
	-20, -20	Mar 18, 19
	28	June 24
	14	Sept 29
Warmest July on record °F	60.1	July
Driest July on Record In.	0.22	July
Snowiest March in.	15.4	2009

Yakutat 2009 records – 61 years of data

Record High temperatures °F:	71	May 2
	84,85	July 6, 7
Record Low temperatures °F	35	June 24
	38	Aug 3
Record precipitation – Inches	7.44	Jan 18
	4.81	Aug 16
Driest May on Record In.	2.58	May Total Precip

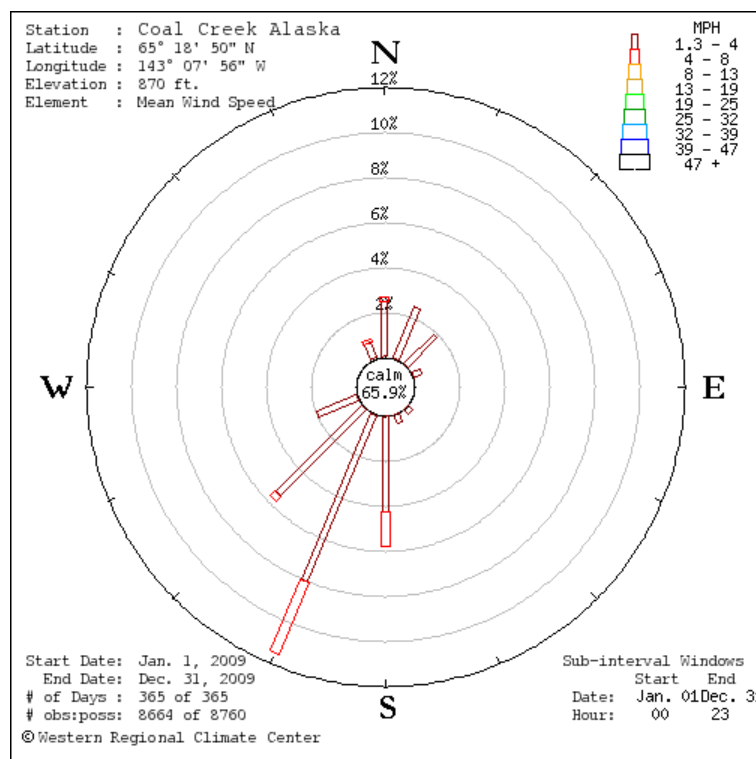
Gulkana 2009 records – 59 years of data

Record High temperatures °F	48, 47, 40	Jan 15-17
	68, 68, 69, 69	Apr 30 - May 3
Warmest July on Record	61.4	July Mean

Appendix C: CAKN 2009 Climate Station Monthly Data

Coal Creek Alaska

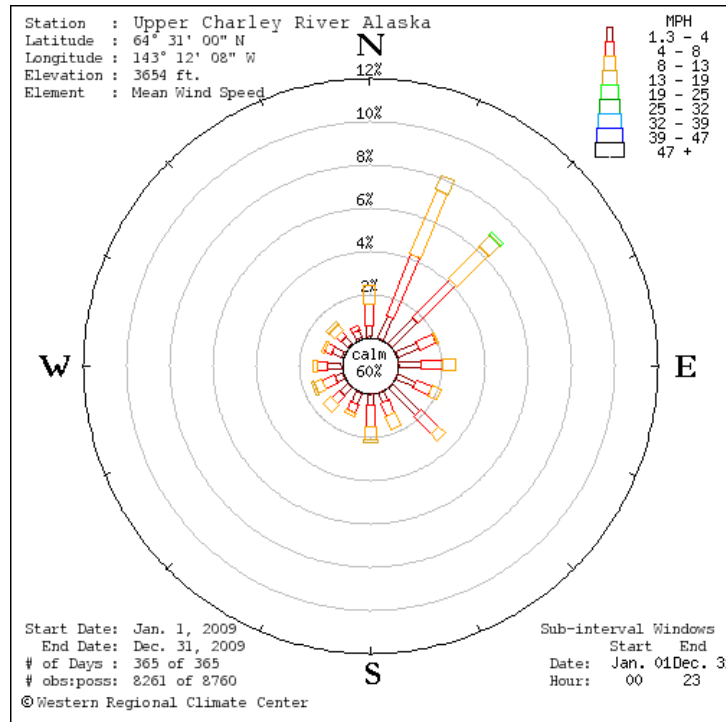
	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Average Soil Temperature - 4 Inches			Average Relative Humidity			Snow Depth
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.
Jan-09	151	1	99	14	-18	48	-58	21	29	17	67	99	37	16
Feb-09	577	1	39	10	1	34	-38	19	20	18	74	94	43	19
Mar-09	7674	2	217	15	-2	34	-35	18	20	17	66	94	26	23
Apr-09	17842	2	224	10	30	71	-13	22	27	18	58	98	14	18
May-09	22436	2	215	93	48	76	24	29	30	27	52	100	9	1
Jun-09	23849	1	224	10	58	84	34	30	31	30	58	100	17	1
Jul-09	23647	1	230	10	63	89	36	31	31	31	55	98	17	1
Aug-09	11844	1	212	10	51	81	31	31	32	31	77	98	18	1
Sep-09	8189	1	210	9	43	69	15	32	32	31	80	98	30	1
Oct-09	2803	1	207	8	27	49	4	31	31	31	80	98	19	1
Nov-09	255	1	188	9	-4	29	-34	31	31	31	80	91	67	5
Dec-09	101	1	205	25	-2	31	-37	27	31	24	77	93	51	8



Upper Charley River Alaska

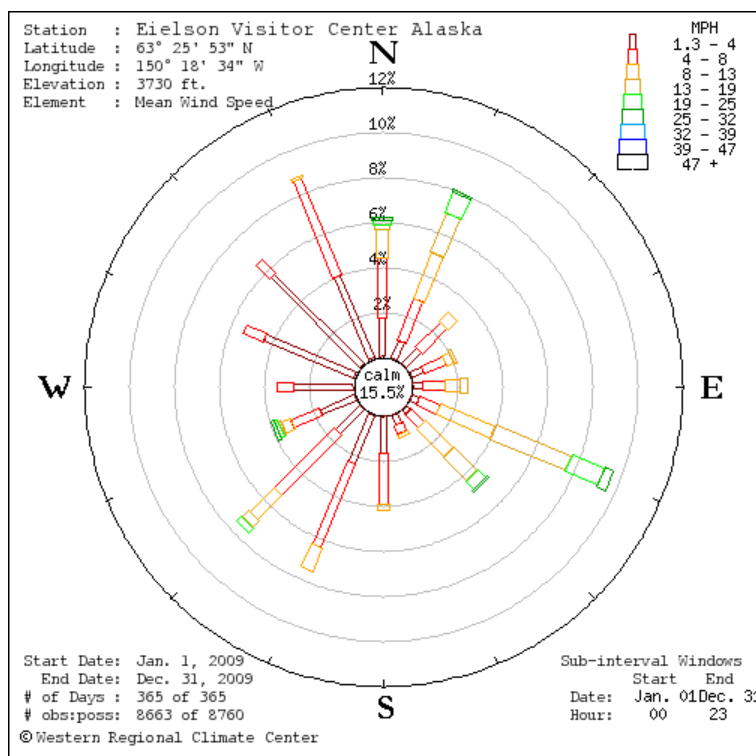
	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Average Soil Temperature – 4 Inches			Average Relative Humidity		Snow Depth	
Date	ly	mph	Deg	mph	Deg F			Deg F			%		in	
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.
01/2009	367.5	m	m	m	-7.2	39.0	-34.0	m	m	m	m	m	m	16.1
02/2009	1325.0	m	m	m	-1.7	25.0	-31.0	m	m	m	m	m	m	16.4
03/2009	5771.0	m	m	m	-0.9	32.0	-29.0	m	m	m	m	m	m	15.0
04/2009	9170.0	m	m	m	25.0	58.0	-1.0	m	m	m	m	m	m	16.4
05/2009	12569.0	m	m	m	42.3	63.0	23.0	m	m	m	m	m	m	6.8
06/2009	13077.0	m	m	m	49.9	71.0	35.0	m	m	m	m	m	m	0.0
07/2009	14661.0	5.3	181.8	29.0	56.5	76.0	38.0	m	m	m	57.0	99.0	20.0	0.0
08/2009	7887.0	m	m	m	46.3	73.0	31.0	m	m	m	m	m	m	0.0
09/2009	4858.0	4.5	20.5	20.0	37.9	60.0	19.0	m	m	m	66.0	100.0	40.0	2.4
10/2009	2291.0	5.7	22.2	27.0	24.0	39.0	6.0	m	m	m	87.7	100.0	40.0	3.1
11/2009	338.3	4.3	19.2	25.0	1.8	24.0	-16.0	m	m	m	87.4	97.0	74.0	7.4
12/2009	116.9	5.0	41.2	24.0	8.7	33.0	-16.0	m	m	m	83.6	96.0	12.5	9.9

The station was repaired twice for bear damage in 2009.



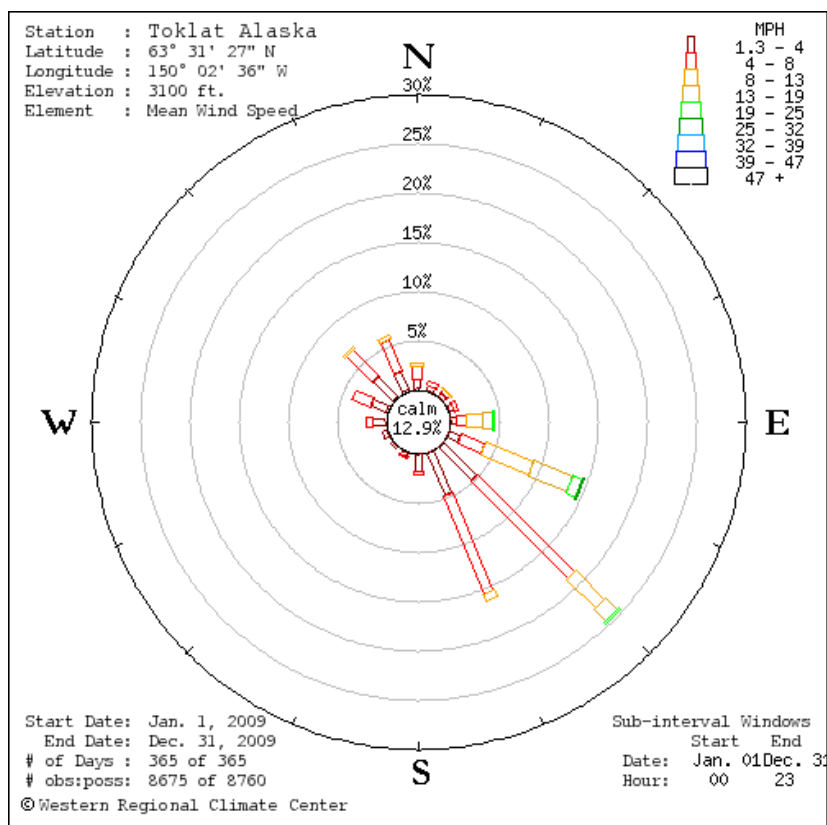
Eielson Visitor Center Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Average Relative Humidity		
Date	ly	mph	Deg	mph	Deg F			%		
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.
01/2009	542	8	334	48	11	46	-25	55	99	9
02/2009	2375	6	295	31	13	36	-27	62	98	11
03/2009	7095	6	292	43	10	37	-33	66	100	12
04/2009	12713	5	341	30	27	55	0	59	99	11
05/2009	14671	5	225	23	40	59	22	61	100	14
06/2009	12465	5	211	27	46	62	33	71	100	23
07/2009	14526	7	135	32	56	73	40	57	100	25
08/2009	8833	4	205	20	45	68	32	78	100	22
09/2009	7311	4	314	22	40	60	18	69	100	31
10/2009	3406	6	359	36	32	56	6	70	100	27
11/2009	958	5	310	41	11	37	-14	68	96	27
12/2009	254	8	350	77	25	49	-28	51	98	m



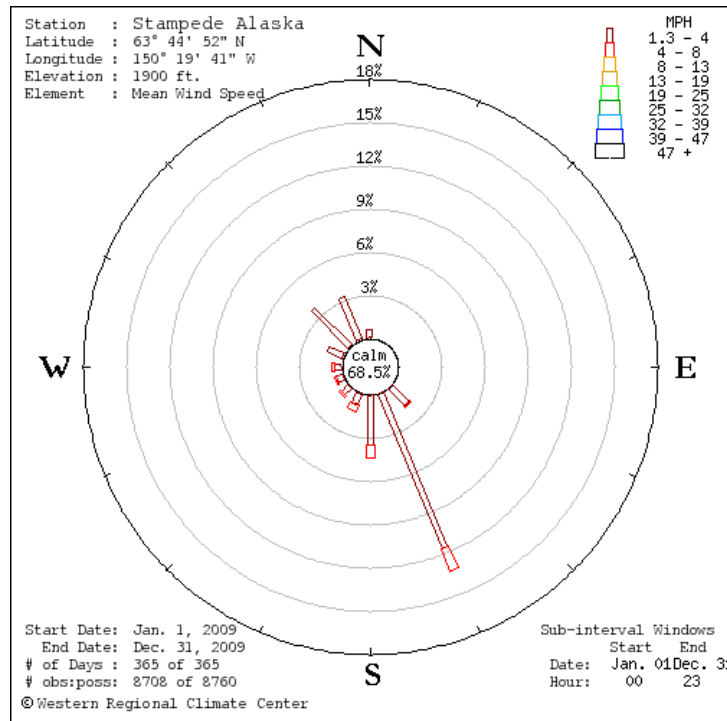
Toklat Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Average Soil Temperature – 4 Inches			Average Relative Humidity			Snow Depth
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.
01/2009	406	6	142	44	1	45	-41	24	31	20	69	97	18	8
02/2009	1942	6	135	33	9	32	-32	23	27	19	67	93	36	10
03/2009	6228	6	133	30	4	33	-35	26	28	25	68	97	29	18
04/2009	10729	7	129	28	25	56	-7	28	34	26	64	97	19	17
05/2009	13464	5	135	23	42	63	25	43	58	31	56	99	13	0
06/2009	11916	5	113	24	49	66	31	51	63	41	67	99	18	0
07/2009	13524	6	124	29	57	76	40	57	68	48	58	99	22	0
08/2009	8413	4	142	22	47	72	29	47	64	39	75	99	19	0
09/2009	5645	4	131	20	39	63	10	41	52	32	73	100	22	0
10/2009	2656	6	143	37	30	55	-3	30	42	22	76	100	30	1
11/2009	670	5	145	35	6	38	-27	22	25	19	75	94	45	4
12/2009	155	8	138	39	18	41	-30	27	28	23	66	99	6	11



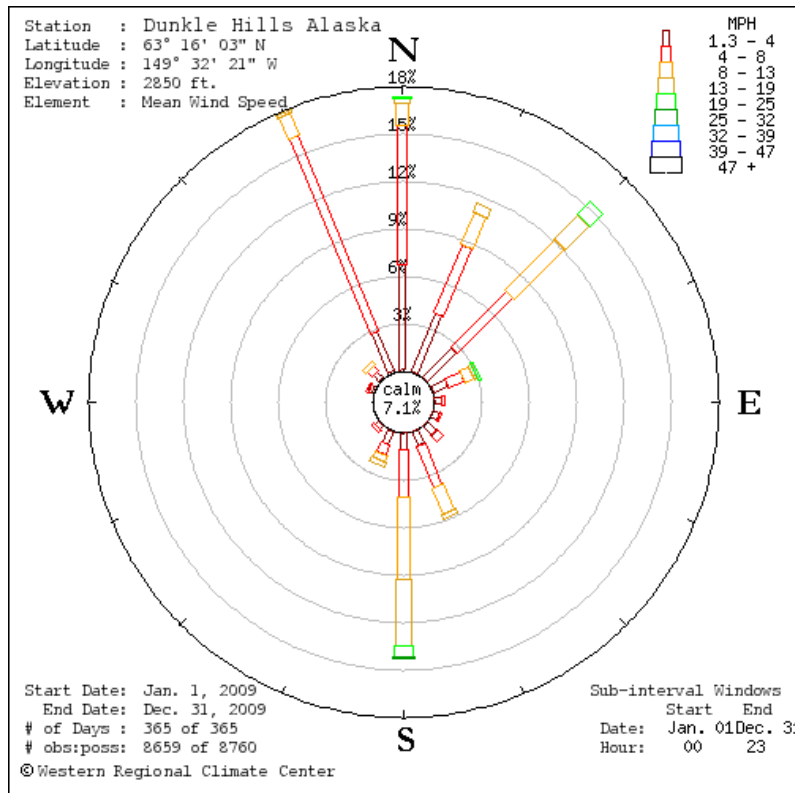
Stampede Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Average Soil Temperature – 4 Inches			Average Relative Humidity			Snow Depth
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.
01/2009	153	1	201	22	-11	49	-50	18	22	14	74	97	33	15
02/2009	616	1	200	12	4	34	-43	17	20	12	78	97	25	17
03/2009	5381	1	182	17	2	38	-42	19	21	16	70	97	28	25
04/2009	10965	2	160	10	28	64	-10	24	32	18	62	95	17	20
05/2009	13646	2	214	11	44	70	22	43	61	32	57	97	13	1
06/2009	13193	1	157	11	52	75	30	54	66	43	65	98	18	0
07/2009	13755	1	147	12	59	82	34	61	76	49	59	97	18	0
08/2009	8576	1	142	9	49	80	24	52	69	40	75	99	13	0
09/2009	5495	1	152	8	40	68	11	42	55	32	78	98	29	0
10/2009	2434	1	166	9	27	59	-8	29	40	20	87	99	40	3
11/2009	266	1	190	15	-1	33	-37	22	26	18	81	94	49	13
12/2009	117	1	192	23	4	37	-35	21	24	18	83	97	16	11



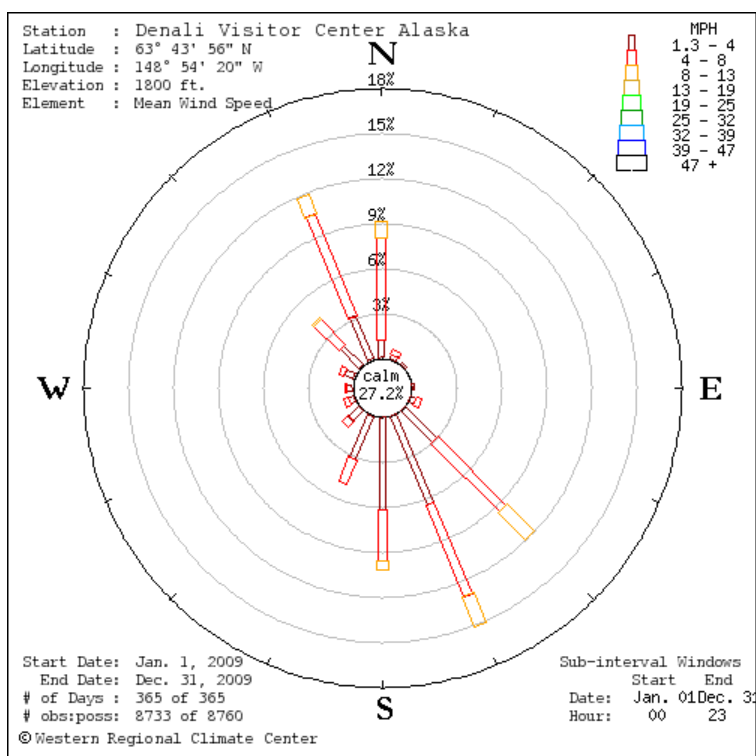
Dunkle Hills Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Average Soil Temperature - 4 Inches			Average Relative Humidity			Snow Depth
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.
01/2009	658	9	19	38	3	38	-25	26	29	21	75	100	31	24
02/2009	2404	6	10	69	7	25	-29	26	27	25	77	98	40	29
03/2009	7498	8	21	31	8	28	-17	24	26	20	73	99	36	27
04/2009	13063	6	9	32	24	42	-2	26	30	23	78	100	49	23
05/2009	15884	7	11	25	40	65	23	34	47	0	63	100	16	3
06/2009	13994	7	161	24	48	65	33	46	53	36	71	100	28	0
07/2009	13581	6	152	25	55	77	36	54	62	46	74	100	23	0
08/2009	9392	6	118	25	46	69	25	49	56	0	81	100	24	0
09/2009	6561	4	27	22	40	65	14	42	50	33	80	100	30	0
10/2009	3330	4	16	27	31	55	8	32	38	24	81	100	45	0
11/2009	1105	6	17	32	9	36	-20	21	26	16	79	97	45	4
12/2009	346	6	13	32	16	32	-22	24	28	17	76	98	10	9



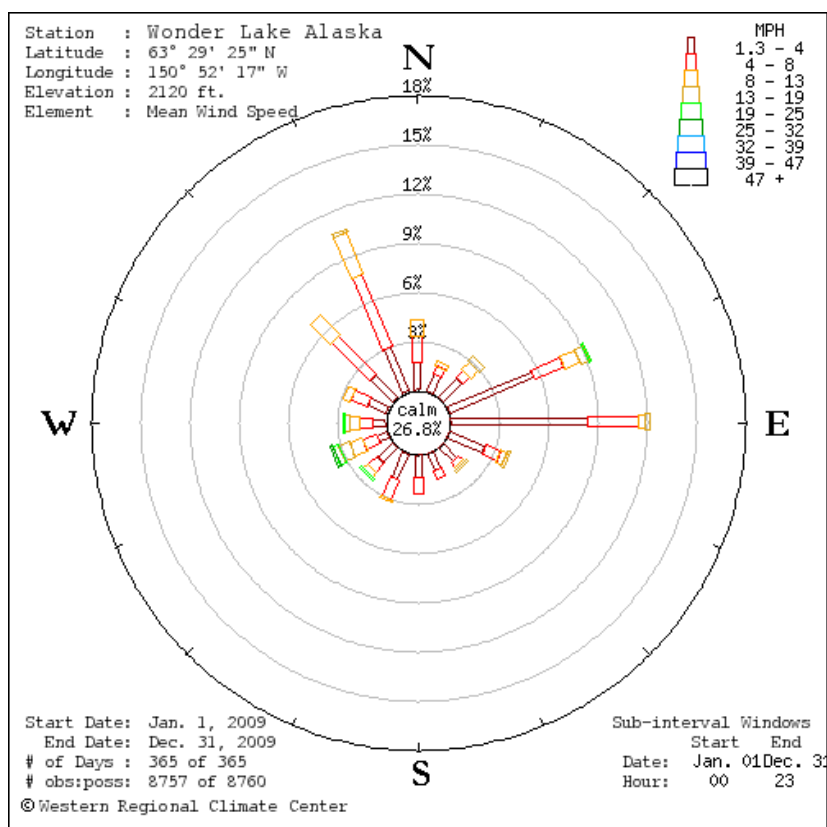
Denali Visitor Center

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Ave Fuel Temp			Average Relative Humidity			Precipitation
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Total
01/2009	223	4	173	37	-5	47	-52	-6	45	-50	57	92	30	0
02/2009	1164	4	166	32	7	34	-41	6	34	-43	54	81	15	0
03/2009	6120	5	262	31	8	46	-32	7	57	-36	48	82	16	0
04/2009	11685	4	159	29	30	65	-16	29	76	-20	50	89	20	0
05/2009	14894	4	133	22	46	78	17	46	91	13	49	95	11	0
06/2009	14978	4	165	24	54	78	26	55	92	22	57	98	19	1
07/2009	14611	4	162	24	62	93	34	61	97	27	56	98	17	1
08/2009	9322	3	153	21	50	82	22	49	86	15	67	93	19	3
09/2009	6280	3	163	19	42	74	8	40	77	6	70	94	25	1
10/2009	2666	4	162	22	31	64	-7	29	67	-15	74	94	40	0
11/2009	228	2	164	26	3	40	-38	0	38	-40	75	90	32	0
12/2009	98	3	177	23	7	43	-32	5	41	-35	74	92	23	0



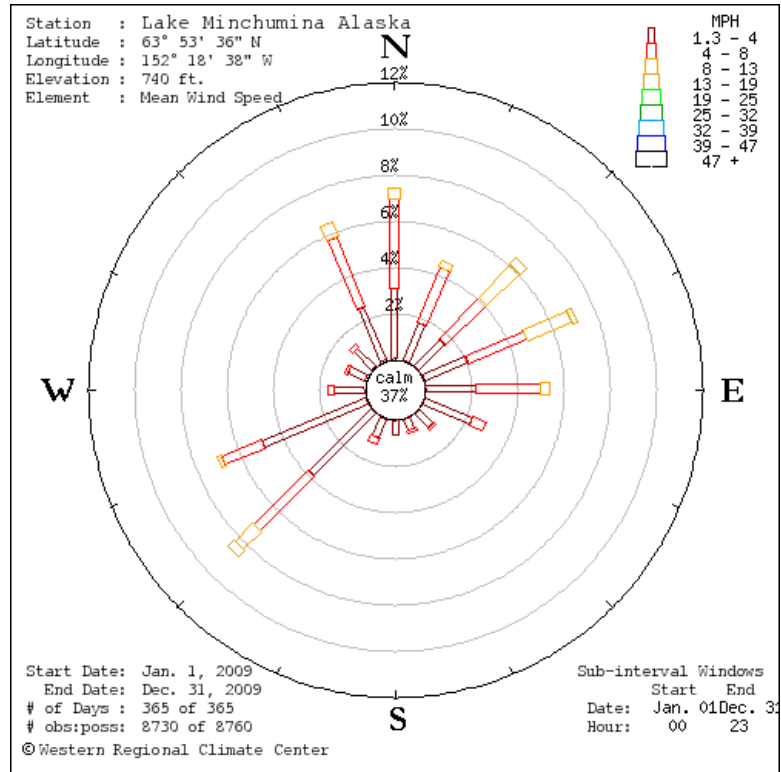
Wonder Lake Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Ave Fuel Temp			Average Relative Humidity			Precipitation
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Total
01/2009	492	4	71	56	-4	48	-46	-5	47	-47	63	100	19	0
02/2009	2171	4	72	38	7	39	-36	7	45	-37	66	100	21	0
03/2009	7544	4	14	52	3	40	-31	5	48	-32	60	100	24	0
04/2009	14021	4	55	31	27	66	-9	30	81	-10	58	100	16	0
05/2009	16411	5	1	46	43	69	18	47	79	17	58	100	11	1
06/2009	14956	5	355	31	51	75	33	55	90	32	69	100	22	3
07/2009	14567	5	21	30	60	82	36	62	98	36	60	100	24	1
08/2009	10191	4	8	34	49	79	27	50	90	25	78	100	21	2
09/2009	7282	4	46	27	40	68	9	41	77	7	76	100	32	0
10/2009	3249	4	49	26	26	56	4	26	60	2	84	100	30	0
11/2009	699	3	82	39	1	36	-27	1	35	-28	68	100	39	0
12/2009	187	3	73	31	10	45	-33	9	43	-34	61	100	26	0



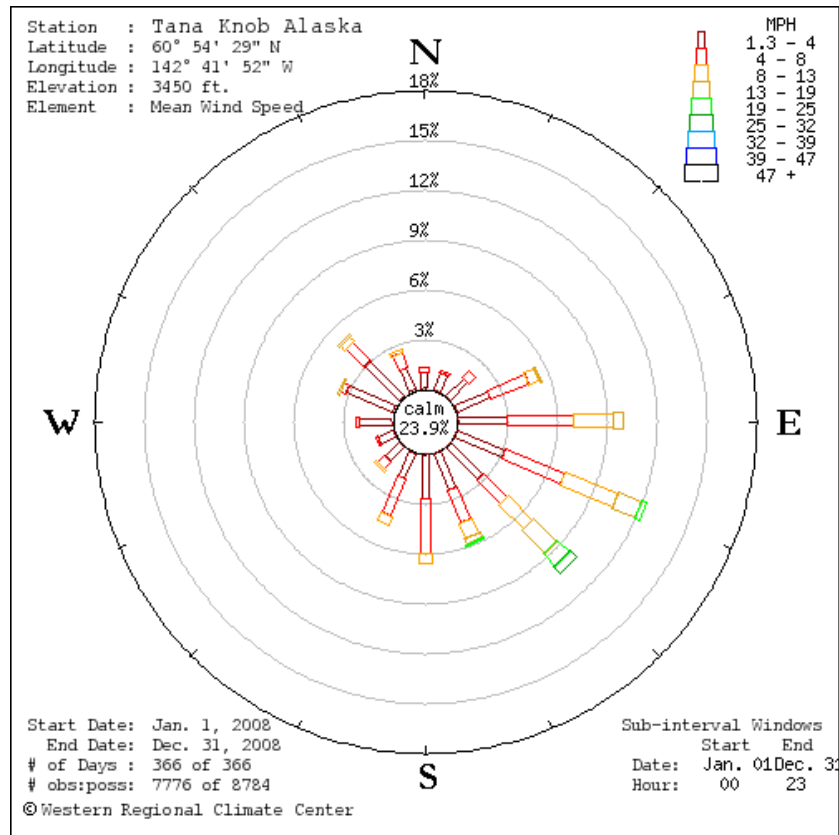
Lake Minchumina Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Ave Fuel Temp			Average Relative Humidity			Precipitation
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Total
01/2009	256	4	337	36	-5	42	-44	1	32	-32	71	98	45	0
02/2009	661	2	277	25	1	34	-41	7	23	-20	79	97	44	0
03/2009	5015	5	53	36	7	31	-21	18	24	-3	64	95	25	0
04/2009	11141	3	8	24	33	71	-5	32	81	20	58	98	14	0
05/2009	14640	3	339	22	50	82	27	52	95	21	53	100	13	1
06/2009	12756	3	254	20	58	81	38	58	93	34	65	100	17	2
07/2009	12914	2	291	27	66	93	43	65	96	39	58	100	19	0
08/2009	8315	3	294	21	53	78	34	52	79	29	75	100	26	4
09/2009	5032	3	1	25	45	73	20	44	73	16	79	100	33	1
10/2009	2054	4	21	22	31	50	10	30	54	7	85	100	46	0
11/2009	439	3	350	29	1	26	-30	3	25	-25	82	98	58	0
12/2009	5	1	328	30	-1	30	-34	8	24	-8	87	100	70	0



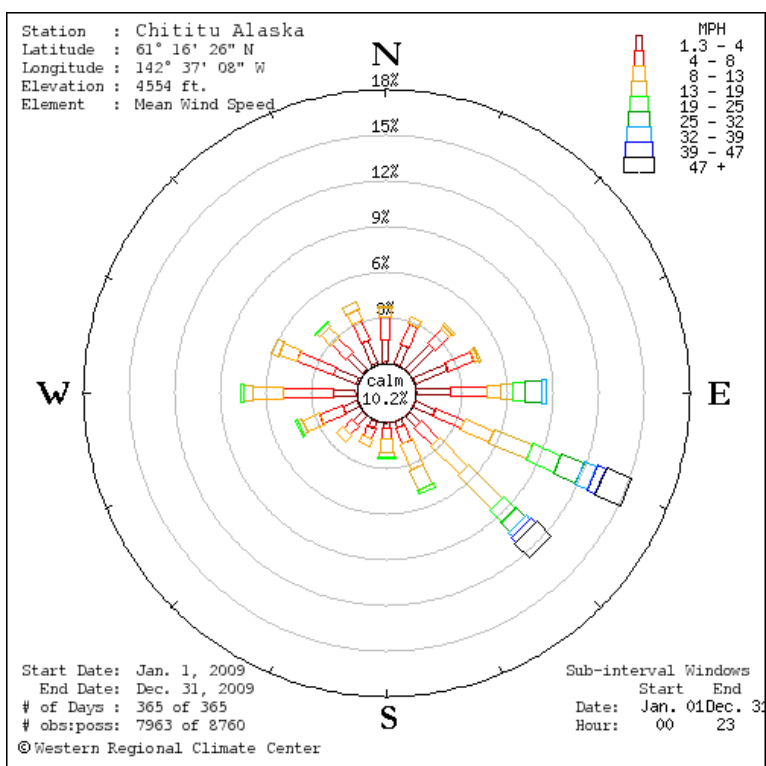
Tana Knob Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Average Soil Temperature - 4 Inches			Average Relative Humidity			Snow Depth
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.
01/2008	703	5	30	51	11	35	-19	31	31	31	79	100	26	35
02/2008	1458	6	113	47	17	40	-23	31	31	30	84	100	20	41
03/2008	6974	5	74	42	21	36	7	31	31	31	74	100	34	46
04/2008	10818	6	94	37	28	47	10	31	31	30	66	100	30	45
05/2008	15341	5	49	37	38	51	25	31	31	31	63	100	27	27
06/2008	14689	4	172	20	43	59	32	41	56	31	68	100	20	1
07/2008	11614	4	167	23	46	63	36	49	57	43	75	100	13	1
08/2008	9183	3	155	14	45	55	38	48	53	43	80	100	37	1
09/2008	4709	4	122	22	41	51	31	41	48	35	76	100	43	1
10/2008	1818	4	61	45	24	38	0	33	35	0	87	100	50	15
11/2008	614	5	80	44	20	32	-4	32	33	32	81	100	30	29
12/2008	90	3	33	24	20	33	0	32	32	32	92	100	63	40



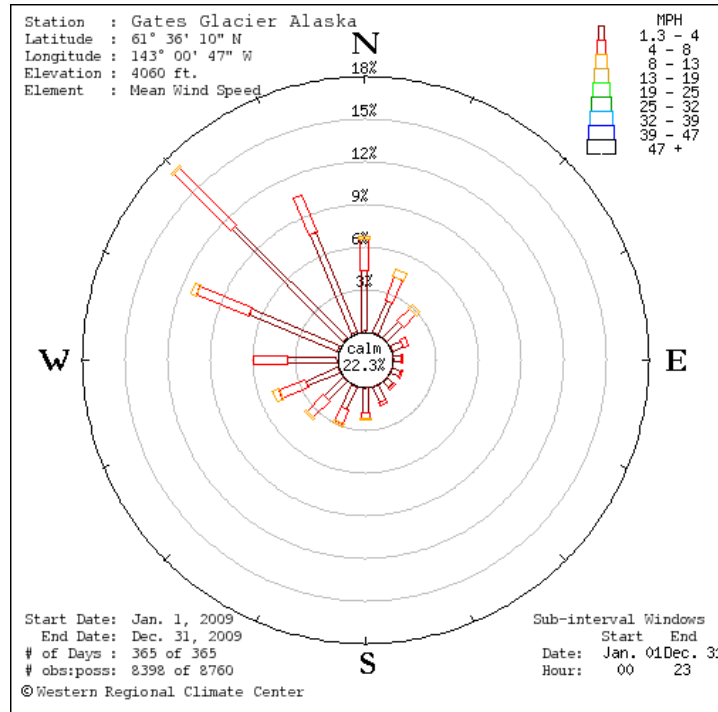
Chititu Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Ave Fuel Temp			Average Relative Humidity			Snow Depth
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.
01/2009	331.8	19.4	90.6	66.0	17.2	42.0	-20.0	21.0	29.0	11.0	77.2	100.0	20.0	m
02/2009	2253.0	9.1	87.4	46.0	12.1	29.0	-14.0	14.1	17.0	11.0	67.6	98.0	16.0	m
03/2009	5568.0	9.6	83.9	48.0	11.8	34.0	-11.0	13.7	17.0	10.0	70.5	98.0	34.0	m
04/2009	10345.0	6.9	63.0	39.0	25.8	50.0	6.0	20.4	31.0	0.0	68.9	99.0	27.0	m
05/2009	13974.0	7.2	246.1	35.0	38.4	55.0	26.0	32.2	35.0	30.0	60.3	100.0	14.0	m
06/2009	13668.0	6.4	255.2	29.0	45.3	65.0	31.0	35.9	39.0	34.0	65.3	100.0	14.0	m
07/2009	14160.0	7.7	286.8	41.0	53.1	69.0	39.0	40.6	47.0	37.0	59.6	99.0	26.0	m
08/2009	7717.0	7.5	129.2	47.0	44.6	64.0	36.0	41.6	46.0	39.0	80.9	100.0	20.0	m
09/2009	5517.0	8.2	101.1	44.0	40.0	53.0	26.0	37.2	41.0	32.0	72.1	100.0	41.0	m
10/2009	2308.0	7.1	90.6	45.0	30.4	49.0	0.0	32.0	33.0	32.0	76.3	100.0	20.0	m
11/2009	m	m	m	m	m	m	m	m	m	m	m	m	m	m
12/2009	m	m	m	m	m	m	m	m	m	m	m	m	m	m



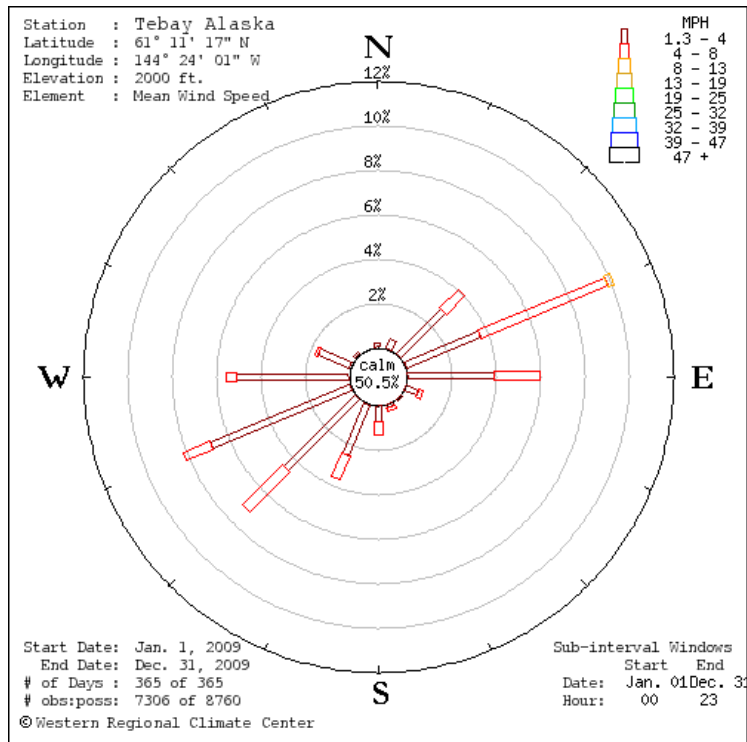
Gates Glacier Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Average Soil Temperature - 4 Inches			Average Relative Humidity			Snow Depth
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.
01/2009	173	3	7	28	7	44	-26	31	33	31	81	100	22	51
02/2009	1663	3	314	20	13	28	-9	31	31	0	82	98	32	78
03/2009	5160	3	311	25	13	32	-7	31	31	0	83	100	44	80
04/2009	11278	3	317	18	26	51	6	31	32	31	70	98	29	75
05/2009	15939	3	272	20	39	56	29	31	32	31	60	100	21	43
06/2009	15267	3	275	24	46	61	32	44	62	31	63	100	12	4
07/2009	14061	3	290	19	54	68	39	55	68	44	54	92	24	8
08/2009	7167	2	313	18	45	64	37	48	64	42	79	100	17	6
09/2009	6356	3	306	20	40	54	25	41	52	33	68	100	35	10
10/2009	2744	3	314	28	32	50	8	32	38	0	78	100	31	6
11/2009	830	4	321	30	15	36	-13	30	33	0	76	100	28	16
12/2009	544	3	319	55	23	36	0	30	35	7	66	100	0	29



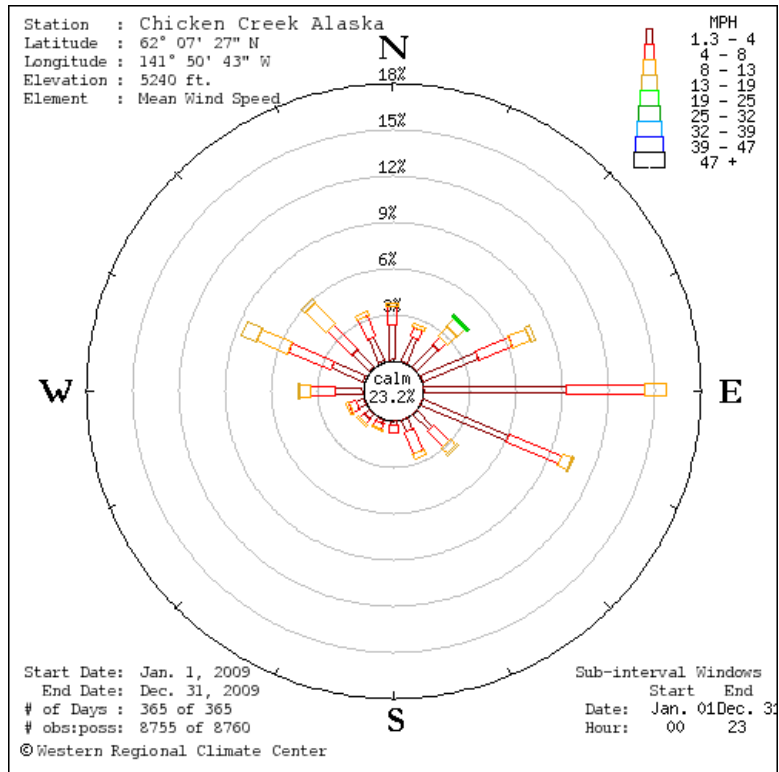
Tebay Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Average Soil Temperature - 4 Inches			Average Relative Humidity			Snow Depth
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.
01/2009	127	3	63	13	3	42	-34	m	m	m	81	100	54	37
02/2009	598	2	81	12	9	30	-17	m	m	m	83	99	44	52
03/2009	5909	3	98	22	16	34	-17	m	m	m	72	100	35	53
04/2009	12155	2	183	17	30	52	0	m	m	m	73	100	33	42
05/2009	15328	3	231	11	43	66	27	m	m	m	64	100	14	4
06/2009	4421	3	244	9	54	72	32	m	m	m	60	100	17	1
07/2009	m	m	m	m	m	m	m	m	m	m	m	m	m	m
08/2009	5286	2	252	10	49	64	6	m	m	m	89	99	29	4
09/2009	5697	1	210	9	43	65	21	m	m	m	85	99	36	4
10/2009	2455	1	105	11	34	53	14	m	m	m	88	100	43	4
11/2009	312	2	88	10	13	37	-17	m	m	m	85	98	50	14
12/2009	49	0	19	10	13	34	-14	m	m	m	92	99	82	32



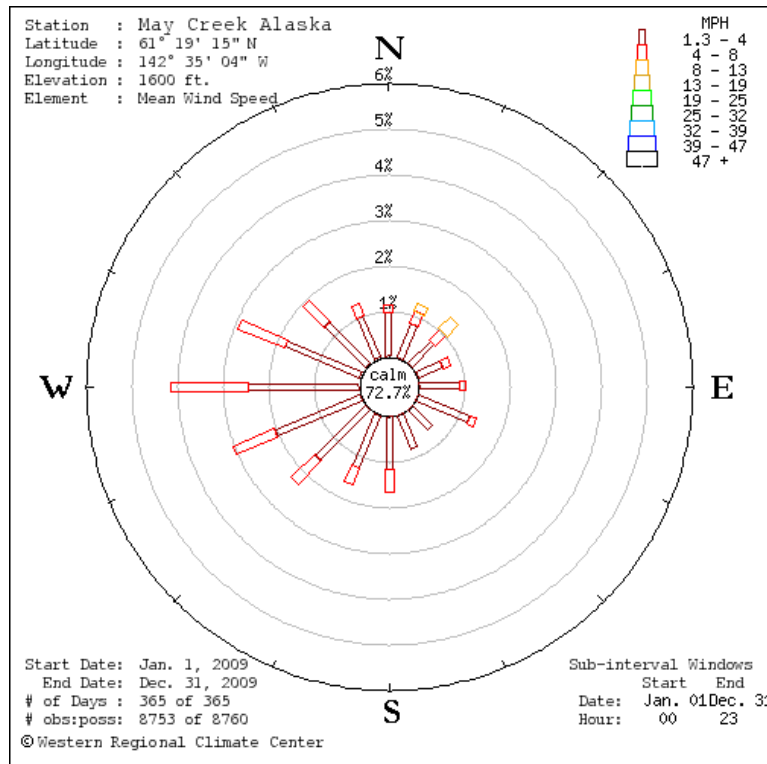
Chicken Creek Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Average Soil Temperature - 4 Inches			Average Relative Humidity			Snow Depth
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.
01/2009	422	3	78	45	4	43	-33	18	20	14	75	100	24	6
02/2009	3144	4	65	29	10	34	-23	18	20	18	60	92	8	7
03/2009	7045	4	76	43	6	37	-20	16	18	14	67	99	24	3
04/2009	13185	3	76	22	24	50	1	18	28	15	60	97	23	2
05/2009	15569	5	41	27	37	52	22	29	31	26	59	100	15	0
06/2009	14937	6	349	25	44	63	29	31	33	30	62	100	13	0
07/2009	14658	6	357	27	52	69	38	37	39	33	54	100	23	0
08/2009	8363	5	37	26	44	66	32	37	38	36	73	100	16	0
09/2009	6455	4	47	22	38	53	19	35	36	32	63	100	25	0
10/2009	2863	3	88	23	27	52	-1	32	32	30	77	100	22	1
11/2009	810	3	67	40	8	25	-19	25	30	23	73	97	33	1
12/2009	417	3	52	39	21	39	-3	22	23	19	55	95	23	2



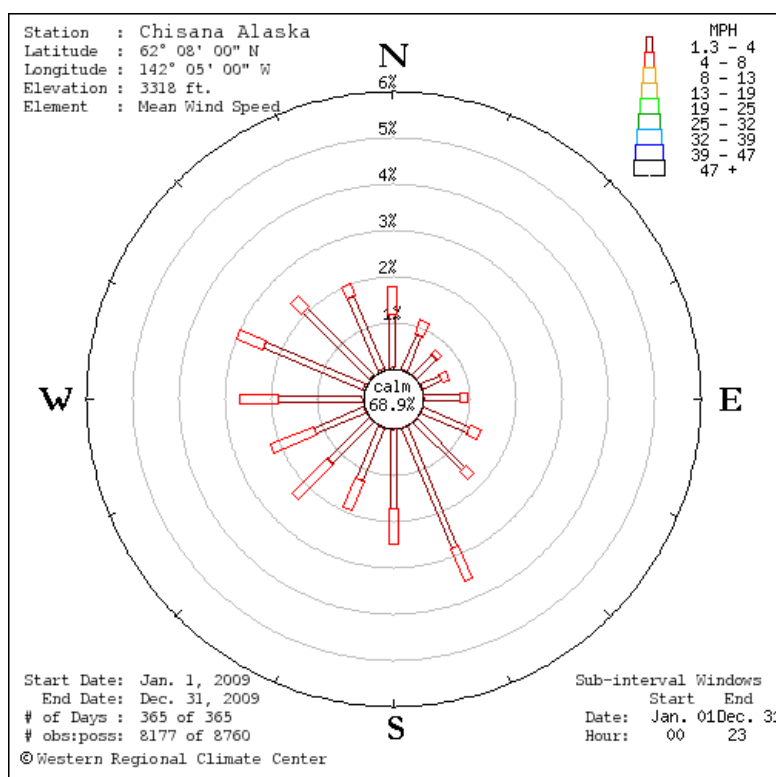
May Creek Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Ave Fuel Temp			Average Relative Humidity			Snow Depth	Precipitation
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in	in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Total
01/2009	213	0	201	23	0	47	-49	2	32	-48	80	99	33	m	0
02/2009	945	0	177	79	5	36	-27	12	27	-8	78	96	35	m	0
03/2009	4747	0	201	24	14	46	-28	15	29	-11	65	97	25	m	0
04/2009	12347	2	167	19	35	69	-3	33	78	12	59	98	19	m	0
05/2009	16505	2	226	26	48	77	24	51	96	22	54	98	11	0	0.51
06/2009	17357	2	226	17	55	83	26	60	100	25	58	99	11	0	0.92
07/2009	16188	2	218	21	62	89	31	66	109	30	57	99	20	0	0.24
08/2009	8840	1	199	17	52	84	29	53	101	29	81	100	13	m	3.30
09/2009	7457	1	188	21	42	72	11	42	75	10	78	99	30	m	0.14
10/2009	2998	1	175	37	31	63	-8	30	65	-10	88	99	35	m	0
11/2009	432	1	174	16	4	33	-37	7	33	-25	84	99	45	0	0
12/2009	189	0	160	15	4	36	-27	10	28	-12	87	99	56	0	0



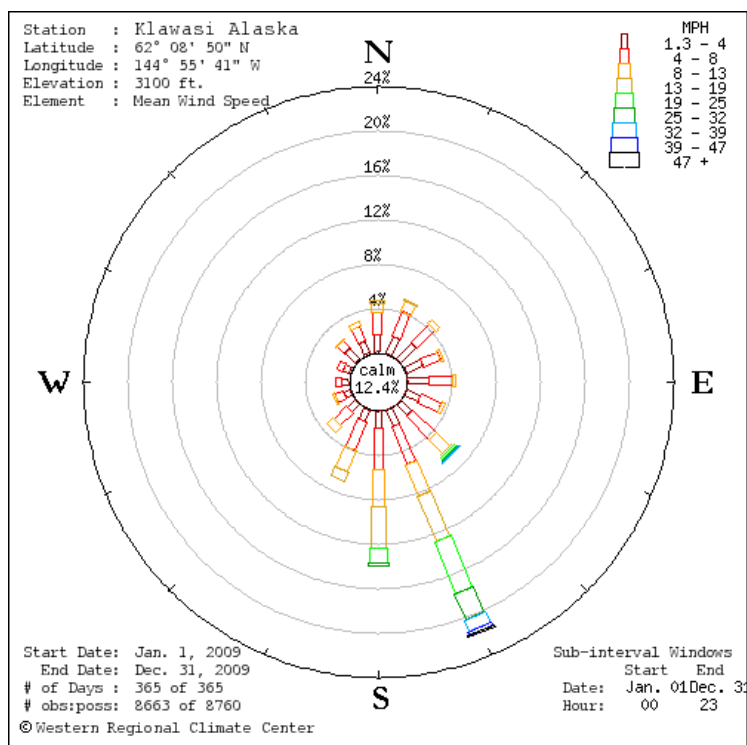
Chisana Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Ave Fuel Temp			Average Relative Humidity			Snow Depth	Precipitation
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in	in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Total
01/2009	227	1	133	36	-7	53	-53	2	32	-27	62	100	16	27	0.00
02/2009	1227	1	186	19	-3	44	-39	2	25	-18	60	100	19	21	0.00
03/2009	4752	1	163	19	4	43	-36	4	19	-18	50	100	14	24	0.00
04/2009	14761	2	151	18	27	68	-16	24	70	7	49	100	14	20	0.00
05/2009	17546	2	190	21	43	68	16	44	79	11	56	100	8	3	1.56
06/2009	17208	2	151	31	52	80	21	52	92	17	57	100	7	m	2.84
07/2009	17431	2	173	22	59	85	24	59	97	21	50	100	14	m	0.49
08/2009	6833	2	164	21	51	84	27	51	94	23	66	100	10	m	1.45
09/2009	7597	1	126	19	37	67	5	38	78	1	69	100	19	m	0.25
10/2009	2911	1	125	8	21	56	-20	21	67	-24	82	100	32	1	0.00
11/2009	157	1	126	13	-5	26	-38	-6	25	-35	72	95	51	6	0.00
12/2009	34	0	92	19	0	33	-27	-3	25	-29	76	93	44	7	0.00



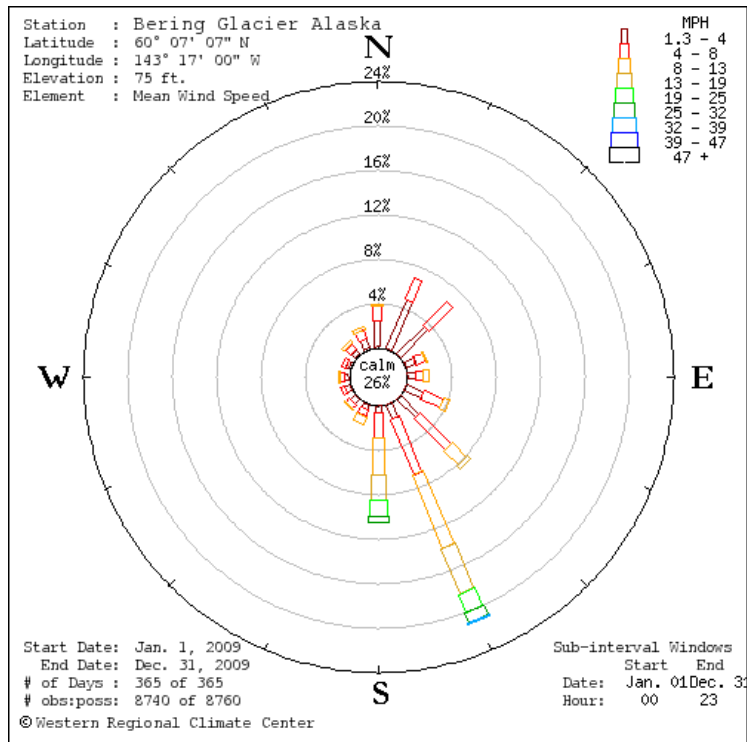
Klawasi Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Ave Fuel Temp			Average Relative Humidity			Precipitation
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Total
01/2009	403	8	142	69	2	48	-33	0	44	-38	20	100	0	0.00
02/2009	2937	6	101	55	9	36	-15	6	34	-20	38	100	0	0.10
03/2009	6597	7	124	51	12	36	-13	10	35	-20	34	100	0	0.00
04/2009	12837	8	141	50	31	60	4	30	66	-3	50	100	0	0.00
05/2009	18029	8	164	39	45	68	26	46	77	21	49	100	16	1.48
06/2009	16328	9	176	36	51	75	33	52	83	28	58	100	14	1.36
07/2009	16568	10	164	43	60	81	42	60	87	37	52	100	24	0.97
08/2009	10159	9	154	54	50	73	32	50	81	24	71	100	18	4.18
09/2009	7410	8	155	45	43	64	21	43	74	15	67	89	31	0.60
10/2009	3430	6	135	56	31	64	1	30	67	7	76	89	38	0.00
11/2009	971	7	136	65	10	37	-18	21	29	4	73	88	27	0.00
12/2009	548	7	128	74	17	40	-14	17	33	-1	70	89	25	0.00



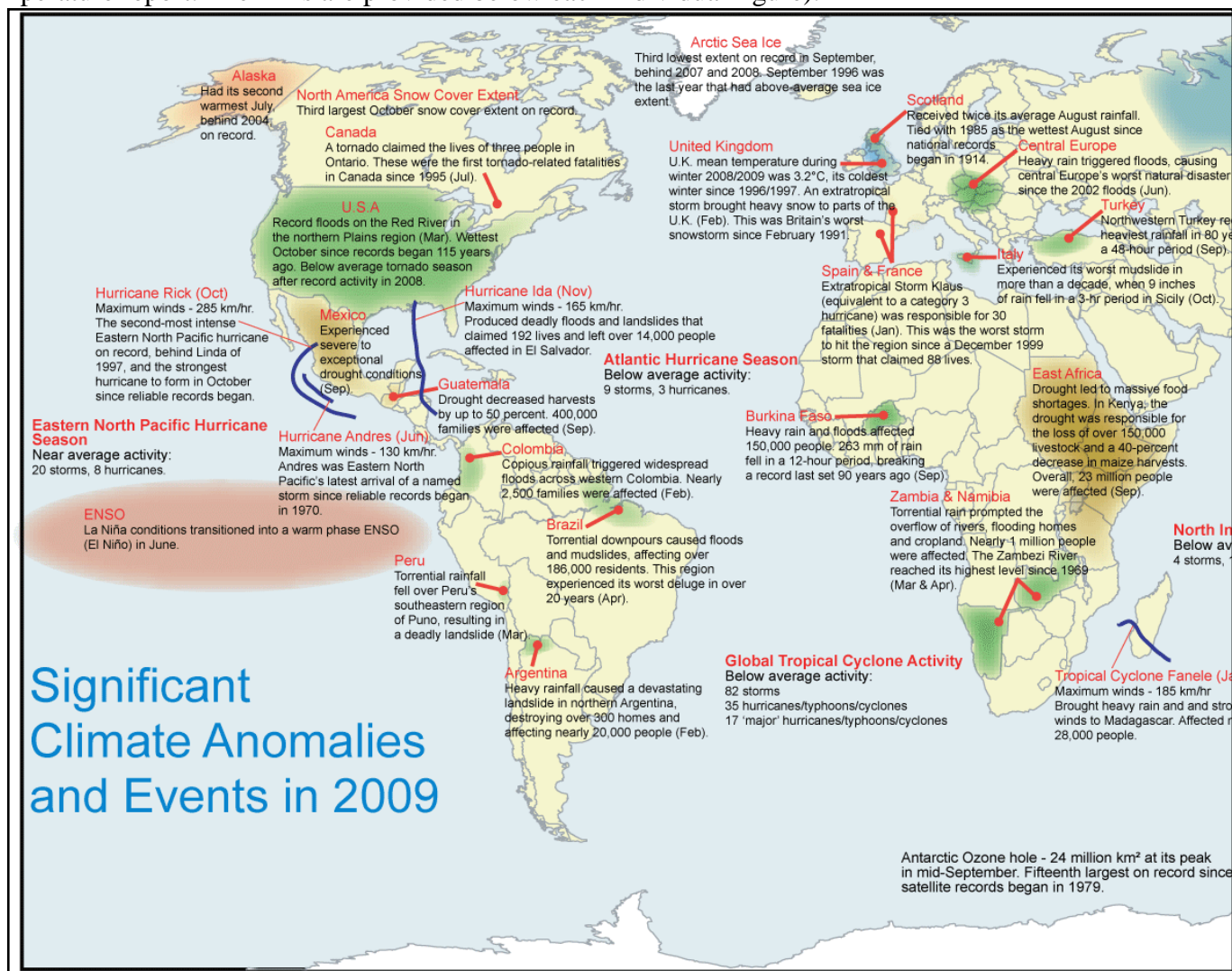
Bering Glacier Alaska

	Solar Radiation	Mean Wind Speed	Mean Wind Direction	Maximum Wind Gust	Average Air Temperature			Ave Fuel Temp			Average Relative Humidity			Precipitation
Date	ly	mph	Deg	mph	Deg F			Deg F			%			in
mm/yyyy	Total	Ave.	Ave.	Max.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Total
01/2009	553.3	8	137	193	27	45	-2	27	41	-4	87	100	39	0
02/2009	2479	4	142	184	24	39	-3	24	33	3	82	100	28	0
03/2009	4570	7	141	186	30	44	-2	29	33	10	78	100	28	0
04/2009	7590	5	113	184	35	53	2	35	64	18	83	100	21	3.46
05/2009	9369	4	34	178	46	65	28	49	81	25	81	100	20	1.49
06/2009	8553	4	30	182	49	65	33	52	81	30	86	100	46	3.31
07/2009	7710	5	48	190	52	68	38	55	85	36	88	100	45	7.47
08/2009	4965	4	54	183	49	63	35	51	79	33	94	100	55	19.22
09/2009	3177	7	151	195	47	62	27	47	75	22	94	100	50	17.96
10/2009	1977	5	137	185	43	56	28	41	62	19	91	100	26	10.02
11/2009	708.6	7	141	198	32	50	8	31	51	-5	90	100	53	0
12/2009	435.9	5	153	180	28	43	3	27	40	5	97	100	61	0



Appendix D: Worldwide Significant Climate Anomalies and Events 2009

(The following figures are excerpts from NOAA's 2009 Annual Climate Summary and NASA's Goddard Institute for Space Studies 2009 global temperature report. The links are provided below each individual figure).

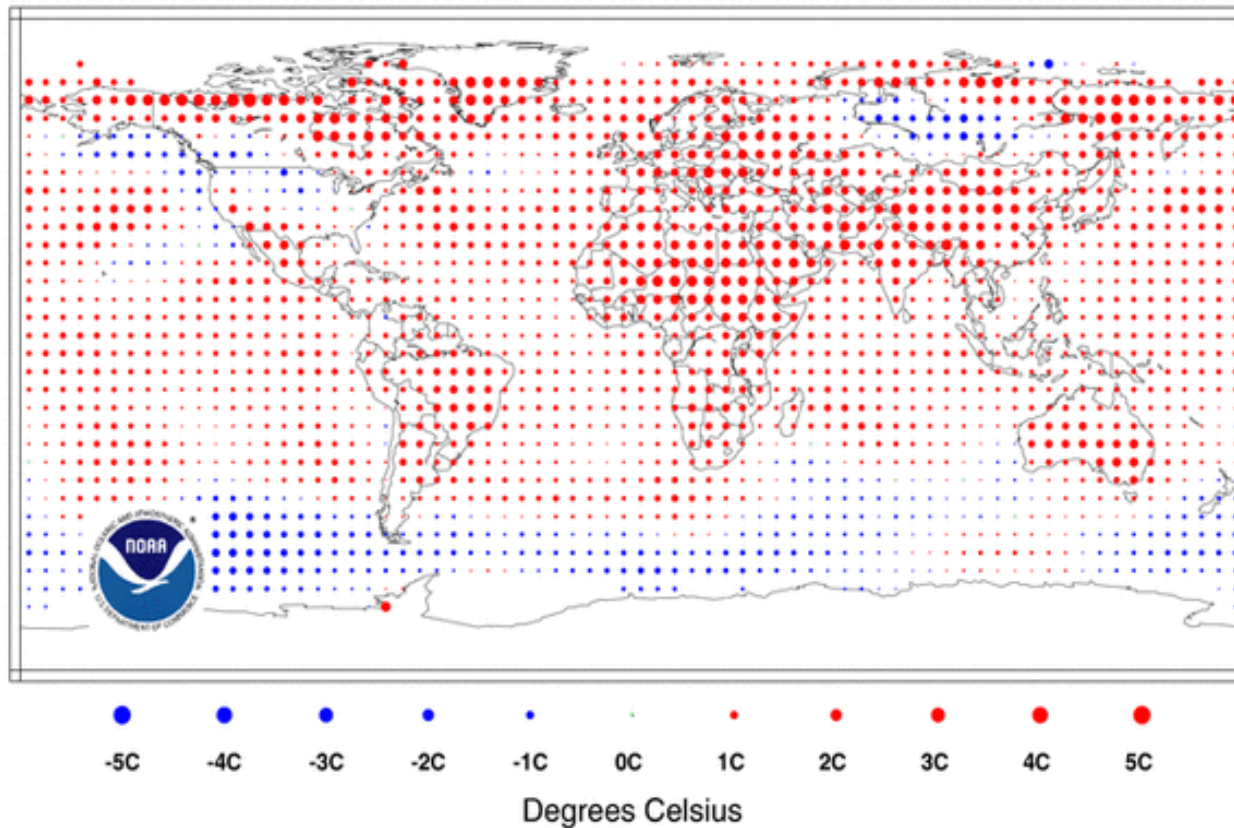


<http://www.ncdc.noaa.gov/sotc/get-file.php?report=global&file=significant-extremes&year=2009&month=13&ext=gif>

Temperature Anomalies Jan-Dec 2009

(with respect to a 1971-2000 base period)

National Climatic Data Center/NESDIS/NOAA

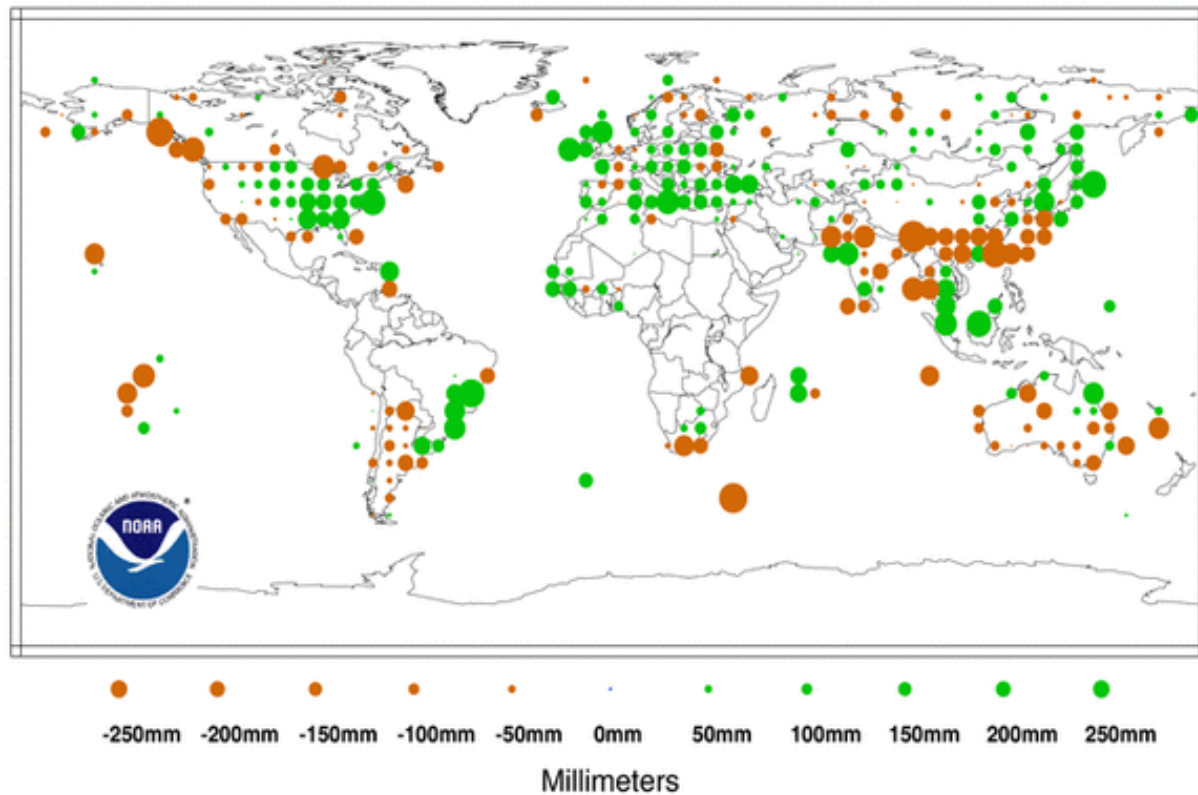


<http://www.ncdc.noaa.gov/sotc/?report=global&year=2009&month=13&submitted=Get+Report>

Precipitation Anomalies Jan-Dec 2009

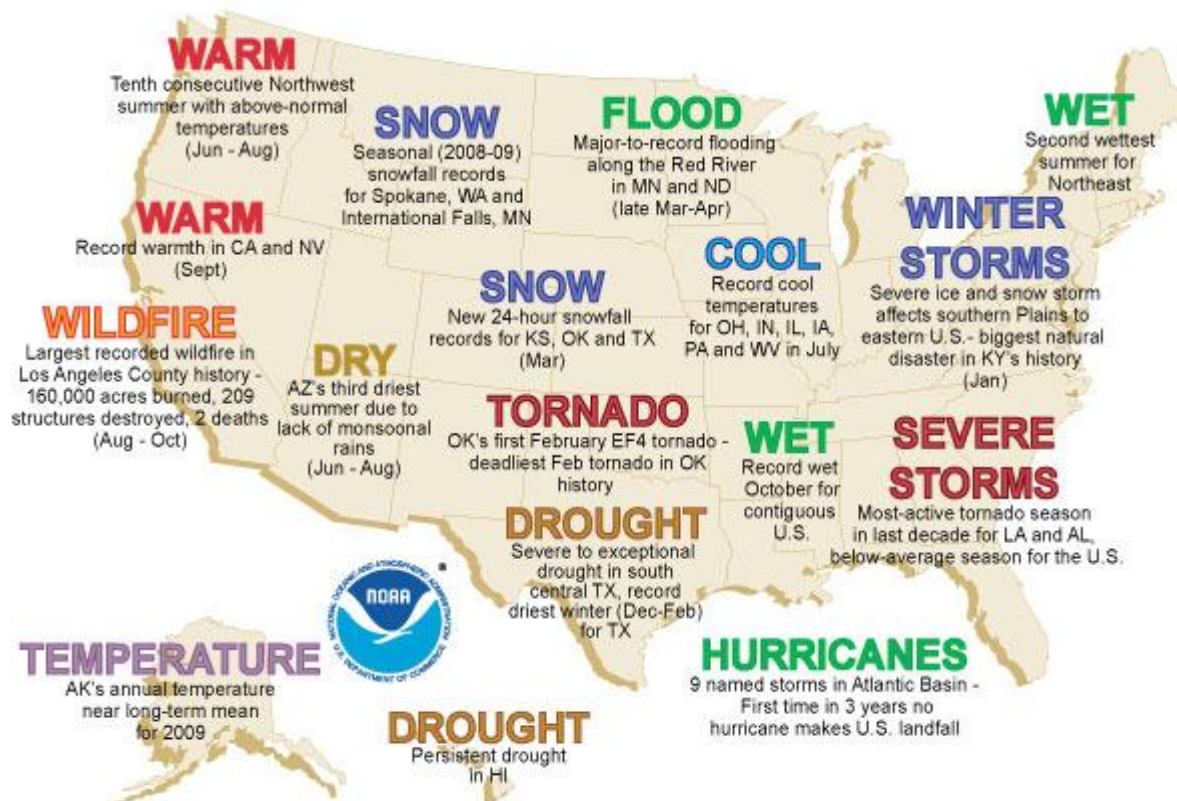
(with respect to a 1961-1990 base period)

National Climatic Data Center/NESDIS/NOAA



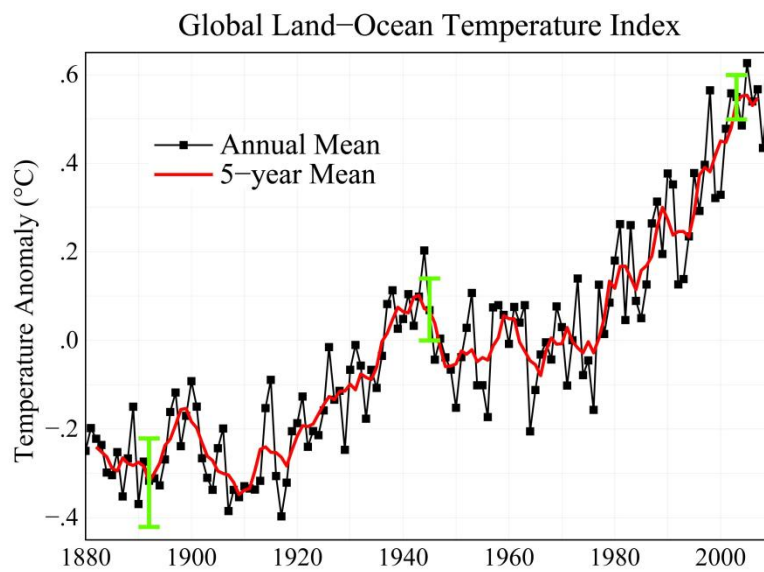
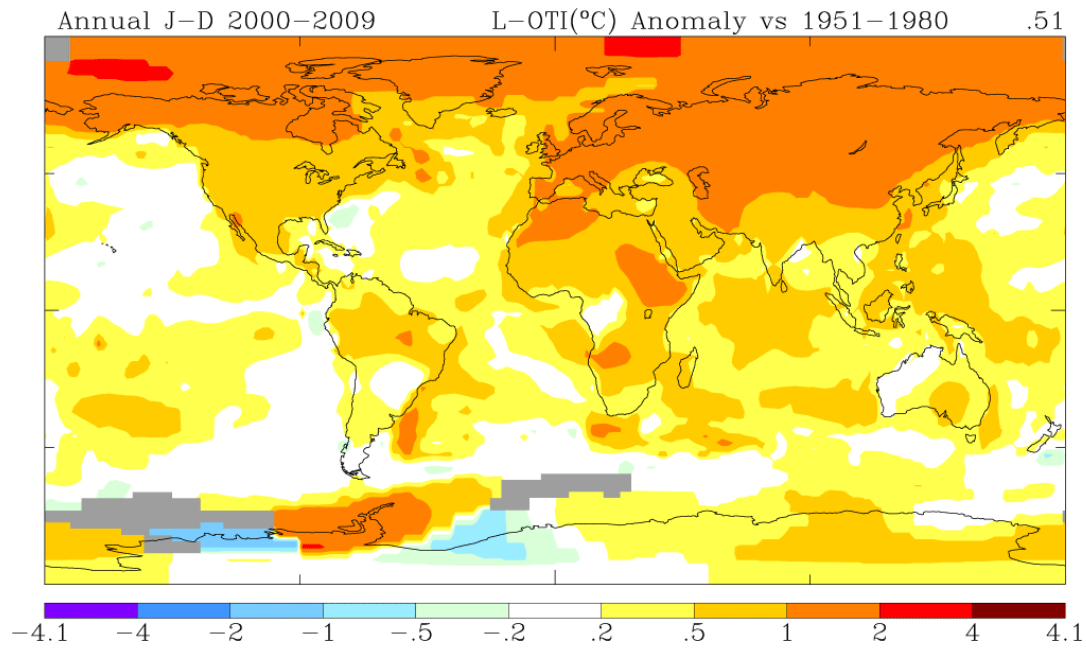
<http://www.ncdc.noaa.gov/sotc/?report=global&year=2009&month=13&submitted=Get+Report>

Preliminary Significant U.S. Weather and Climate Events for 2009



<http://www.ncdc.noaa.gov/oa/climate/research/2009/sig-events-2009.html>

2009: Second Warmest Year on Record; End of Warmest Decade



Graphs and figure courtesy of NASA Goddard Institute for Space Studies

<http://www.giss.nasa.gov/research/news/20100121/>